Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

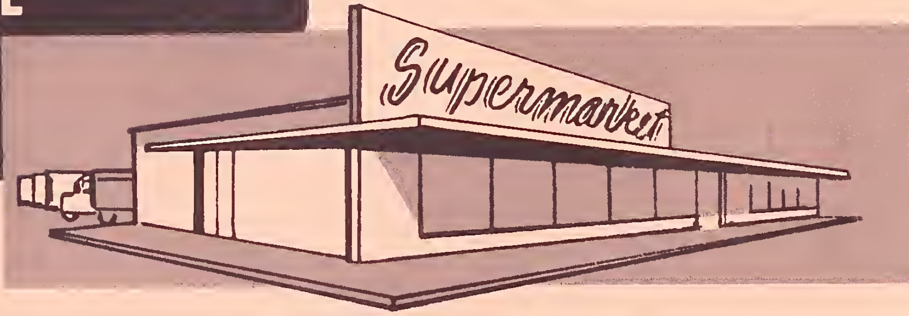
Reserve
1
Ag84Mr

3

U. S. DEPT. OF AGRICULTURE
NATIONA [illegible] BRARY
MAY 3 - 1963
CURRENT SERIAL RECORDS

PRINCIPLES of LAYOUT for RETAIL PRODUCE OPERATIONS

+L3a



Marketing Research Report No. 590

U.S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Transportation and Facilities Research Division

PREFACE

The study reported here deals with the layout of produce backrooms and display areas in retail food stores. The principles reported were developed by studies of the flow of products and by time studies of clerk travel in a large number of supermarkets. This report also summarizes the layout aspects of five earlier marketing research reports, on produce receiving; trimming; packaging and price-marking; display; and sales area pricing methods and display arrangement. These reports dealt primarily with work methods, materials, workplaces, and other handling problems. These and related publications are listed in the Literature Cited section of this report.

The layouts and improved operations described in this report should aid in reducing the costs of handling fresh produce, and thus result in a potential increase in sales. Since fresh produce normally returns a higher portion of its retail selling price to the farmer than canned or frozen foods, this could subsequently increase the farmer's share of the consumer's dollar.

Increases in marketing costs are normally reflected back to the farmer in lower returns, or to the consumer in higher prices, or both, as competition among traders generally adjusts costs and margins. Conversely, reduction of costs can benefit all interested groups--producers, processors, distributors, and consumers.

This study is part of a broad program of research by the Agricultural Marketing Service aimed at holding down the costs of marketing farm products by increasing the efficiency of food wholesaling and retailing.

The study was made under the general supervision of R. W. Hoecker, Chief, Wholesaling and Retailing Research Branch, Transportation and Facilities Research Division, AMS. The Penn Fruit Company, Food Fair Stores, Inc., and American Stores, Inc., of Philadelphia, Pa.; Red Owl Stores, Inc., and Super Valu Stores of Minneapolis, Minn.; Safeway Stores, Inc., Washington, D. C.; Kings Super Markets, Irvington, N. J.; Publix Super Markets, Lakeland, Fla.; and many other firms contributed the use of their stores in conducting tests. Many Federal-State Extension Service employees and equipment suppliers also contributed materially to the data. Store layout specialists of over 50 retailing organizations reviewed this report and made especially helpful suggestions regarding its content.

Washington, D. C. March 1963

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 35 cents

CONTENTS

Page

Summary.......... 3
    Backroom layout and operations.......... 3
    Display area layout and operations.......... 4
Background of the study.......... 5
General layout principles.......... 6
Backroom layout and operations.......... 8
    Produce receiving operation.......... 8
    Produce storage areas.......... 9
    Coolers.......... 11
    Trimming area.......... 13
    Packaging and processing area.......... 14
    Retail-store produce bagging.......... 18
    Handling salvage, trash, and garbage.......... 20
Produce department display and customer service area.......... 21
    Display counter arrangement.......... 21
    Location of service scale in bulk departments.......... 22
Development of a complete produce department layout in a new store.......... 24
    Step 1: Establish the expected volume.......... 24
    Step 2: Decide on the methods of operation to be used.......... 24
    Step 3: Determine the location of the produce department and the approximate area needed.......... 25
    Step 4: Determine the number and kind of workplaces, handling equipment, and storage space needed.......... 30
    Step 5: Locate the area for each operation.......... 35
    Step 6: Fit the work stations, handling equipment, and storage into the general areas, and tie them together.......... 36
    Step 7: Estimate flexibility and adequacy of the department with different volumes of business.......... 36
    Step 8: Plan walls and other permanent fixtures.......... 37
    Step 9: Construct flow diagrams and compare with alternate layouts. 38
    Step 10: Make adjustments and prepare a final layout.......... 38
Alternate layout situations.......... 38
Procedure for reorganizing an existing department.......... 40
Examples of improved layout and equipment installations in remodeled markets.......... 47
    Case study in produce layout No. 1.......... 47
    Case study in produce layout No. 2.......... 48
    Results of produce department remodelings.......... 52
Instructing and training employees.......... 52
Literature cited.......... 54

SUMMARY

Good layout of a retail produce department saves construction and operating costs, reduces spoilage, and assists in selling produce. Thereby it holds down the cost of marketing farm products. Principles developed by researchers in this study are designed to assist operators in preparing produce layouts that will achieve the most effective use of work methods, equipment, and materials consistent with maximum sales potential and product protection. Produce departments remodeled in seven stores in accordance with the principles in this report were able to improve their dollar sales per man-hour by 15 to 88 percent.

Previous publications have reported on improved procedures for receiving, storing, trimming, packaging, pricing, and displaying produce. This report provides the procedure for utilizing these prescribed improvements in an overall produce layout.

Backroom Layout and Operations

General layout principles for produce backrooms are presented and illustrated in this report, including such recommendations as keeping the floors all on one level, adjacent to the display area; having wide passageways and clear aisles; and providing ample lighting and ventilation and comfortable working conditions. Suggestions for specific operations and facilities include:

Produce receiving facilities should include truckbed-level docks, a door exclusively for receiving, a backroom arranged so that produce can go directly into storage, efficient handling equipment, and a desk for recordkeeping.

Storage areas and aisles should be marked off to facilitate use of handling equipment, should have adequate space for "breakdown" of produce (getting wanted items out of mixed stacks), shelf space for loose or easily damaged items, and cabinet space for supplies; and should be easily accessible.

Cooler width should be determined by the handling equipment used; shelves are needed for small items; adequate center aisles to move equipment are needed; skid or pallet parking space should be provided; and doors should open in the direction of the most traffic.

The trimming area should be near the cooler, with a rack for positioning crates at the correct height and position; a way of disposing of trimmings and trimmed produce should be provided; there should be storage for tools, materials tubs, baskets, and handtrucks; and a small sink is needed.

A production line for packaging, processing, and weighing produce should be adjacent to the cooler and dry storage area; the scale should be near the door to the sales area; individual accessible workplaces should be provided for each worker; the work areas should have storage for unprocessed and finished product which can be used without lifting the crates (roller conveyors are most effective); and the product should flow from one work station to the next.

Produce bagging workplaces should be located next to the supply of produce to be bagged; space is needed for multiple dumping at the work station; a holding area should be provided for finished bags; closing devices should be close

to the operator at a comfortable height; and storage space for finished bags and for supplies is needed.

Salvage, trash, and garbage storage should be located at the point where these byproducts originate; containers should be collapsed, and stacked neatly.

Display Area Layout and Operations

Produce display areas should be located near the beginning of the store shopping pattern, but not too near an entrance or exit; only one aisle, with produce on both sides, should be provided; and the aisle width should be adequate to handle peak-period customers and clerks without congestion. The department should be arranged to encourage complete shopping, with special displays used to pull customers to "dead" areas.

When customer service scales are used in the produce department, they should be at the end of the shopping pattern in a fixed location with one clerk stationed at the scale. The scale should be so placed that customers waiting do not block the aisles or displays, with no barriers between the customer and clerk. A shelf is needed on the customer's side of the scale, with all tools and materials handy. A workspace for doing odd jobs during slack periods should be located on the opposite side of the scale.

Developing a produce department layout in a new store is an important step because operating costs of the store will be influenced for many years by the decisions made by the store designer. The layout should be prepared with care, utilizing as much information as it is possible to get about the operation, equipment, work methods, product handled, inventory levels, sales patterns and methods, and other factors that affect the layout. A step-by-step procedure is recommended so that adequate consideration is given to all aspects of the produce department's operation, such as (1) deciding on expected volume; (2) deciding on the methods of operation to be used; (3) determining the location of the produce department and the approximate area needed; (4) determining the number and kind of workplaces, handling equipment, and storage space needed; (5) fitting the work stations, handling equipment, and storage areas into the general area and tying them together; (6) estimating flexibility and adequacy of the department with different volumes of business; (7) planning walls and other permanent fixtures; (8) constructing flow diagrams and comparing them with alternate layouts; (9) making adjustments, and finally establishing the layout.

Points to consider in reorganizing an existing produce department are: (1) Provide adequate backroom space; (2) lay out aisles and passageways; (3) correct irregular floor levels; (4) provide proper storage space for merchandise; (5) arrange for neat, orderly storage of supplies; (6) provide adequate tools and equipment; (7) provide adequate workplaces in proper locations; (8) arrange for proper handling of salvage, waste, and garbage; (9) check lighting, ventilation, work and storage temperatures, and working conditions; and (10) improve counter display construction and arrangement.

Physical facilities are no better than the methods used with them. One of the most important factors in the successful operation of a retail produce department is the instruction and training of the department manager and supervisors. Only when good work methods and operating procedures have become a habit can an installation be called a success.

PRINCIPLES OF LAYOUT FOR RETAIL PRODUCE OPERATIONS

3a,

By Dale L. Anderson, Paul F. Shaffer, James J. Karitas,
and Gordon Flynn, agricultural marketing specialists,
and Marvin D. Volz, industrial engineer, Wholesaling
and Retailing Research Branch, Transportation and
Facilities Research Division, Agricultural Marketing
Service

BACKGROUND OF THE STUDY

A properly functioning produce department is a major factor in the success of a retail food store. Customer surveys have shown that a good produce department is second only to a good meat department among buyers' reasons for shopping at a particular store. While produce sales average 8 to 10 percent of store sales, customers spend more than 10 percent of their shopping time in the produce department.

Unlike many more staple products, produce varies in quality and value and requires special attention in handling, storage, packaging, displaying, and merchandising. Proper facilities and a satisfactory arrangement of equipment, work stations, selling fixtures, and aisleways are necessary to efficiency. The principles and suggestions presented here for the layout and arrangement of produce departments are based on research analysis and experience in a large number of supermarkets. This is the sixth publication in a group devoted to improved produce handling. Previous reports have covered improvements in work methods, equipment, materials and arrangement for receiving, trimming, packaging and pricing, displaying, and customer service for both service and self-service produce departments.1/

Layout principles were developed during these studies and were tested in numerous store installations in cooperation with commercial firms. These principles were based on the following: (1) Product and process flow charts of all the major products handled in retail produce departments; (2) time studies of selected operations before and after changes in layout; (3) customer traffic studies of sales areas before and after changes in layout; (4) use of principles of layout developed in other retail departments or industries; and (5) observations of the effect of many layouts on productivity. In developing layouts, primary consideration was given to minimizing fatigue, walking, lifting, carrying, and congestion and confusion.

1/ Other publications reporting on phases of this study are listed in Literature Cited, p. 54 .

GENERAL LAYOUT PRINCIPLES

Good layout implies the right kind of equipment arranged so as to maximize labor productivity and quality control. Good layout saves space and reduces construction costs. It affects inventories and condition of products, reduces spoilage, and increases sales. It improves the ability of the work force to maintain proper displays, and it improves their morale.

General principles that apply to all functions performed in the backroom are:

1. Have floors all on one level.

Raised floors of coolers, as well as other multiple-level floors, cause serious handling problems. Basements particularly create special problems in transporting produce to sales floors. Elevating conveyors require two additional handlings for each piece, while elevators or dumb waiters large enough to do a satisfactory job are expensive.

2. Have doors and passageways wide enough to permit passage of the largest equipment used.

Doors should be at least 36 inches wide; however, 42- or 48-inch doors are often necessary. This applies to the door between the backroom and selling area, the receiving door, and the cooler door. The largest piece of equipment often is a pallet, skid, or rolling display bin.

3. Keep work and storage areas out of major traffic aisles.

One of the most serious problems in produce backrooms is narrow aisles with workplaces so located that operators stand in the aisles when working. Aisles should be clear and unobstructed. Work stations should include standing space for the operator, out of the traffic aisle.

4. Locate backrooms adjacent to the display sales area.

A backroom distant from the sales area, or a basement backroom requires more clerk travel time than one adjacent to the sales area. Clerk traffic through the sales area also creates congestion and interferes with sales and should be minimized. Clerk travel from backroom to sales area is illustrated in figure 1 for two average-size produce departments. In one, the produce backroom is on the opposite side of the store from the displays, and the amount of clerk travel, approximately 1,000 trips per week, is shown by the width of the line. The travel time was excessive due to customers' interference. The store arrangement is shown also when the produce backroom is adjacent to the displays. The average travel time from backroom to display was reduced by 75 percent, a saving of approximately 40 hours per week.

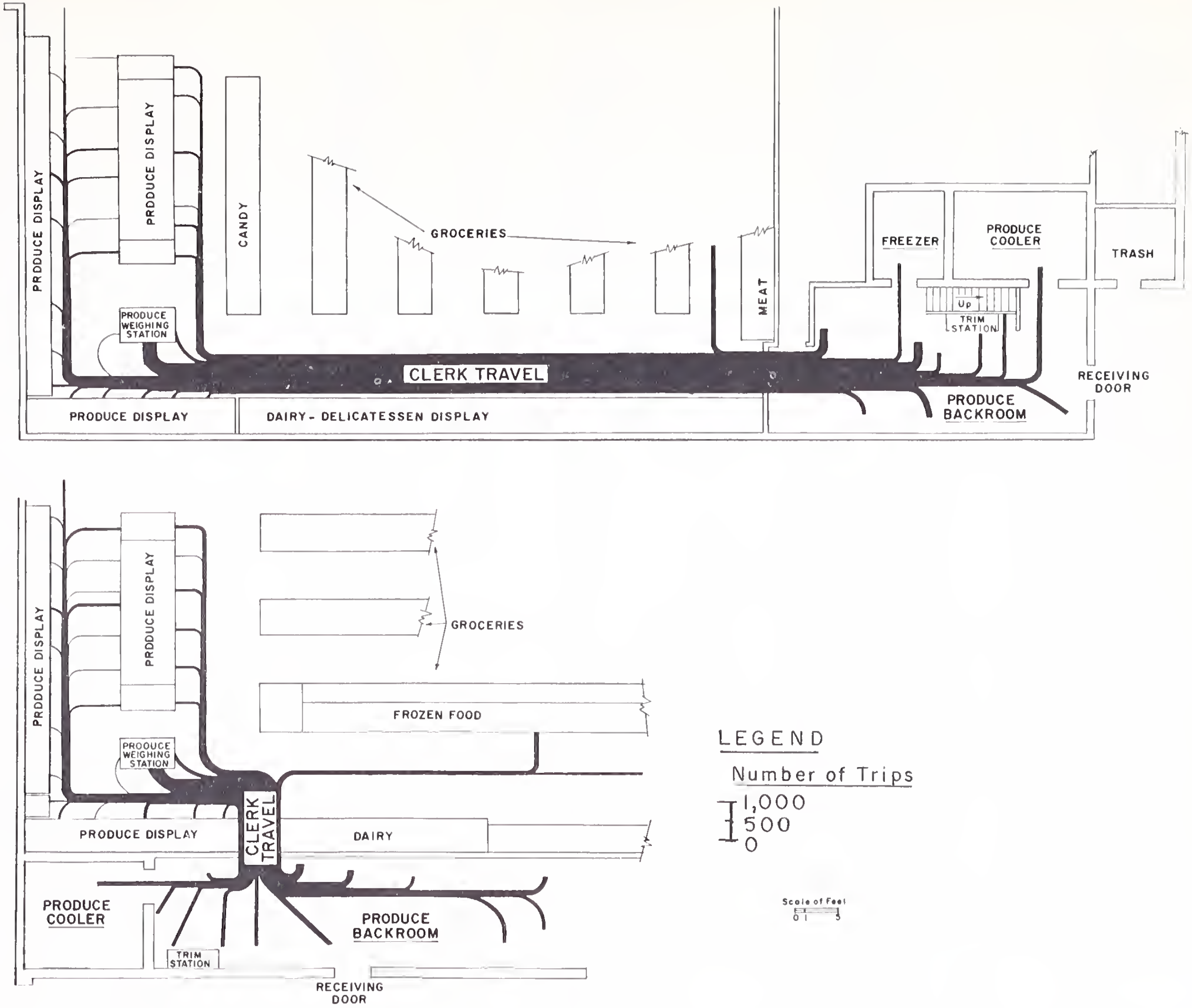


Figure 1.--Clerk travel between backrooms and sales area in two retail produce departments. A. Produce backroom located at back of store. B. Produce backroom adjacent to sales area.

5. Arrange entrances, exits, and work and storage areas to eliminate cross traffic.

In departments employing three or more people, cross traffic can create real problems. Backroom plans should locate entrances, exits, and work and storage areas so that traffic between major points does not cross. This helps to eliminate congestion, confusion, and delays.

6. Provide adequate light and ventilation, and comfortable working conditions.

Backroom work areas should be well lighted and painted. Floors should be constructed of nonslip materials, and kept free of obstructions for ease in cleaning. Compressors should not be near work areas. Adverse working conditions are created when backrooms are kept too cool or too hot or when there is too much noise from equipment. Poor working conditions were noted also where the backroom was refrigerated to take the place of a cooler.

BACKROOM LAYOUT AND OPERATIONS

Produce Receiving Operation

Good layout is important for an efficient receiving operation, especially to provide easily accessible storage space and eliminate conflicts with other operations (10). [2]

1. Have a receiving door that is not needed by other departments during produce receiving periods.

Since produce is often received at the same time as other major deliveries to stores are made, difficulties can result from the joint use of receiving doors. Where possible, produce should have a separate door. The produce department manager should be responsible for security against shortages and pilferage.

2. Use truckbed-level receiving docks.

Modern stores should have truckbed-level docks to reduce handling in receiving. Carts or skids then can be moved directly into the trucks, and unitized handling from warehouse to store can be used if desired.

3. Provide adequate handling equipment.

Plan to have sufficient handling equipment for unloading the largest loads received, with enough reserve to handle any merchandise that may still be stored. Provide a place to store this equipment when not in use. Empty skids, pallets, or trucks should be stacked and conveyor equipment stored where they are easy to get.

---

[2] Underlined figures in parenthesis refer to Literature Cited, p. 54 .

4. Arrange backroom so produce can be placed into storage as received.

Don't rehandle the produce. When skids or pallets are used, unload directly on them and park in prepared storage areas (fig. 2). With conveyors, the product should be fed to its final storage space. Advance preparation of the storage spaces is most important for proper receiving. Old merchandise should be consolidated and moved to a storage area not used for skids, and date codes should be marked on the merchandise at this time.

5. Provide a desk for records.

The desk for records should be so located that the manager can supervise the entire department from it. There is also an advantage in locating it near the produce receiving area to aid in checking the loads and to furnish a convenient place for records.

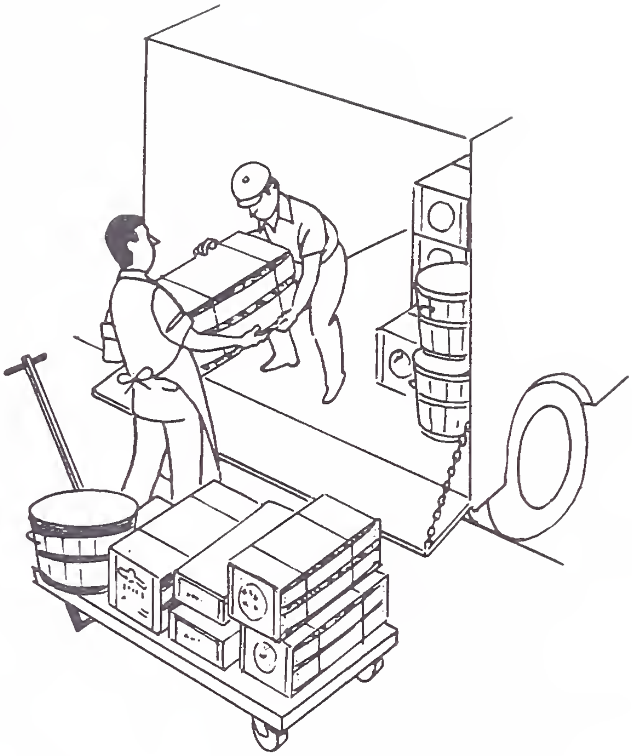


Figure 2.--Use of semilive skids to receive produce in a retail food store where no truckbed-level dock is possible.

Produce Storage Areas

Storage occupies a sizable percentage of the backroom, and it should be properly arranged to make the most effective use of the space available.

1. Mark off storage areas and aisles to fit the handling equipment used.

Lines on the floor marking off all storage areas and traffic aisles are useful regardless of the type of equipment. Allow for cases which overhang on skids or pallets.

2. Leave adequate "breakdown" areas.

When merchandise is received and stored, "breakdown" space is needed (fig. 3). "Breakdown" consists of moving boxes or crates of merchandise aside in order to get items stored under them. Storage space is needed nearby for this merchandise when it is removed from the top of the stacks. The amount of this "breakdown" space, which should be in front of or between skids or pallets, depends on how high cases are stacked on skids and the amount of mixing of items on the skids.

680221 O - 63 - 2

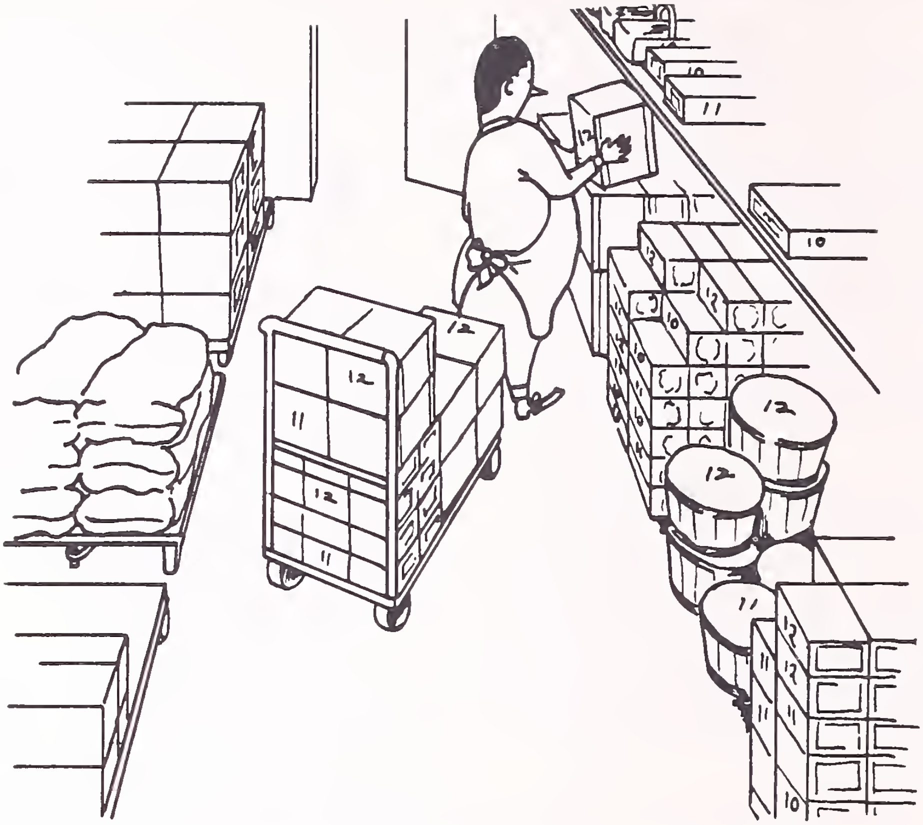


Figure 3.--A produce cooler with storage areas for semi-live skids and an overhead shelf for small items.

3. Provide shelf or rack space for loose, single, or easily damaged items.

In backrooms, dry storage items which most often cause storage difficulty are part-containers of yams, onions, garlic, and similar produce. These can get lost or damaged if not properly handled. Tomatoes often require protected storage.

4. Provide protected storage for supplies.

A large cabinet which can be closed and preferably locked is usually best for packaging supplies and small items. Supplies should be stored and brought out as needed. This encourages clerks to use up old supplies before opening a new box. Floral and plant supplies and crockery also should have locked storage.

5. Storage areas should be easily accessible.

Aisles should be provided to all storage areas, for the use of handtrucks or skids. Climbing over stored items to get needed merchandise or carrying merchandise long distances is thus eliminated.

Coolers

Produce coolers occupy extensive storage areas. Proper use of that space is important to reduce shrinkage and lower handling costs.

1. Determine cooler width according to size and amount of handling equipment used.

When skids are used, the cooler width should be the length of two skids plus an adequate aisle, approximately 1 foot wider than the skids. The length is determined by the quantity of produce to be stored. Sometimes square coolers lose too much space in the center even when double-aisle arrangements are provided (fig. 4). The square cooler in this illustration takes 20 percent more floor space to store the same merchandise than does the rectangular cooler that is not square.

2. Use shelves for storage of small items.

Many items stored in coolers are "single" items or are easily damaged through handling. If these items are left on top of stacks, they tend to be shifted around the cooler throughout the day as they are moved from stack to stack. Adequate shelving to hold all small, single, easily damaged items or part-cases is important for product protection and inventory control. Suspended shelving allows freedom of movement, especially where dollies or pallets are used.

3. Have doors that open in the direction of most traffic.

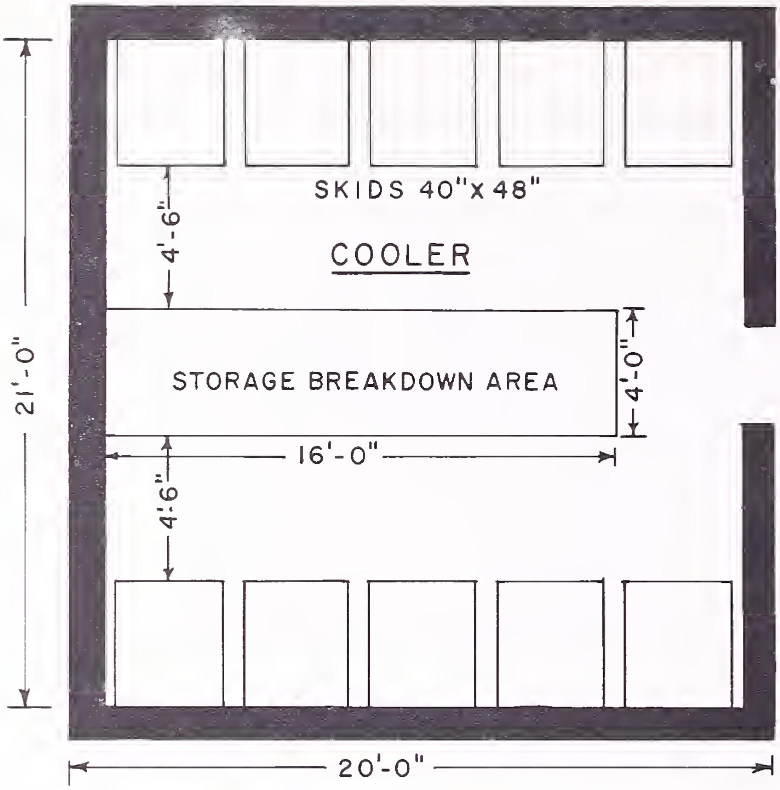
The cooler door should be hung on the opposite side from the trim station so that the trimmer need not walk around the door each trip to the cooler. When personnel enter the cooler in a straight line from the center of a room, the direction of door swing is of less importance.

4. Have center aisles adequate for the materials-handling system.

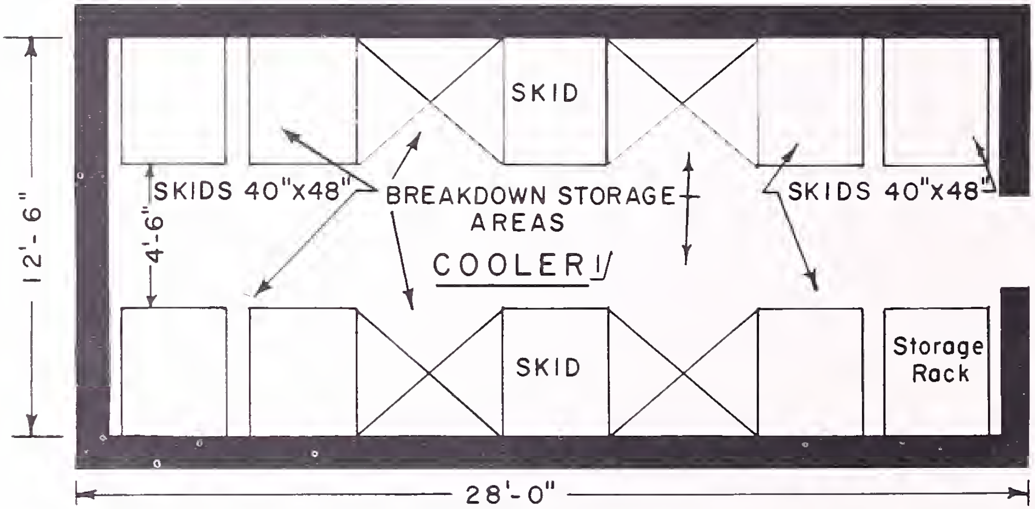
Maneuvering a pallet and jack or a skid and jack into a slot usually requires an aisle at least as wide as the length of the skid or pallet. When pallets are used, a 40- by 48-inch pallet, parked lengthwise (40 inches against the wall), requires a minimum 48-inch aisle. Semilive skids parked with one end against the wall need an aisle equal to their length. When skids are parked parallel to walls, about 4 feet are necessary for comfortable maneuvering. Semilive skids need about 2 feet between them when parked parallel, so that the jack can be attached.

5. Leave space for parking skids or pallets.

The simplest arrangement in rectangular coolers is to keep one side clear for parking loaded skids or pallets, and another side for storage of stacks of unloaded merchandise. In square coolers, parking slots and breakdown areas should be mixed to reduce the distance produce must be carried.



STORAGE······224 Square Feet
AISLE·········196 Square Feet
TOTAL······420 Square Feet



1/ COOLERS SHOULD BE KEPT IN ONE FOOT INCREMENTS WHICH ARE STOCK SIZES FOR MOST MANUFACTURERS

STORAGE······224 Square Feet
AISLE·········126 Square Feet
TOTAL·····350 Square Feet

Figure 4.--Comparison of square and rectangular coolers in usable storage space.

Trimming Area

Trimming is one of the major jobs done in produce backrooms. However, many workplaces for trimming produce are equipped with only a sink and garbage can. Installation of disposal units helps to provide a definite work area, but such units alone are not adequate for a good trimming operation. The operation can be considerably improved by developing a properly arranged work station (6).

1. Locate the trimming area near the cooler.

Most items to be trimmed come from the cooler; therefore, locating the trim station close to it will minimize the travel time required to get the produce to be trimmed.

2. Provide means of obtaining and positioning several crates of merchandise to trim at one time.

3. Position crates of merchandise close to and in front of the operator.

Merchandise then can be removed from the crate easily without damage (fig. 5). Best results are obtained with the crate tilted 45 degrees toward the operator. A conveyor rack of this type was developed by the researchers, called "a trimveyor" (6, p. 39).

4. Provide for disposal of trimmings, so that trimmings do not fall on the floor.

This can be done with garbage cans or a garbage disposal machine. Disposal machines are recommended for stores doing $2,000 or more a week of business in produce.

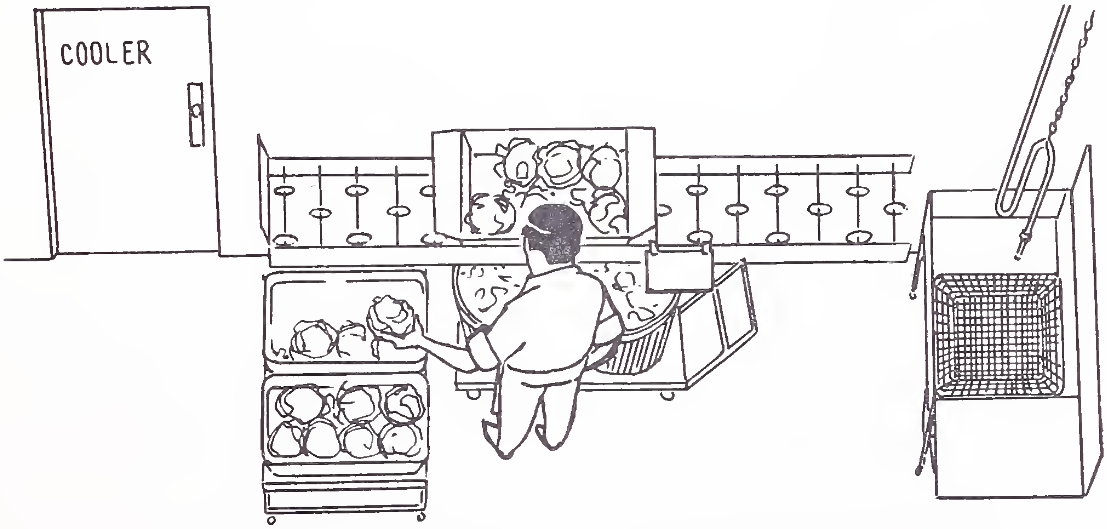


Figure 5.--A workplace for trimming produce.

5. Provide a disposal point for trimmed produce close to the operator, and have it adequate for two containers when sorting is desirable.

6. Have the disposal point high enough so that trimmed produce is placed, not dropped.

7. Provide an adequate storage place for tools and materials close to the operator, with tools and materials pre-positioned for use.

8. Provide a small sink equipped with a spray nozzle for washing produce, near, but not in, the main work area.

9. Locate tubs, baskets, handtrucks, and storage areas close to the work station.

Packaging and Processing Area

Packaging and processing work is one of the biggest jobs in prepackaged-produce departments. Work procedures and equipment layout should permit a smooth integration of the several steps of the process. Work stations have been designed for the special needs of produce, and these can be combined into effective layouts (12). These stations should be arranged to insure a proper flow of work.

1. Locate the processing and packaging line adjacent to cooler and dry storage.

A handtruck should be used to obtain merchandise from the cooler. Travel to the work area from the sales floor to obtain produce for display should be given primary consideration when planning the location of the packaging and pricing area.

2. Arrange for the finished product to end up near the exit to the sales area.

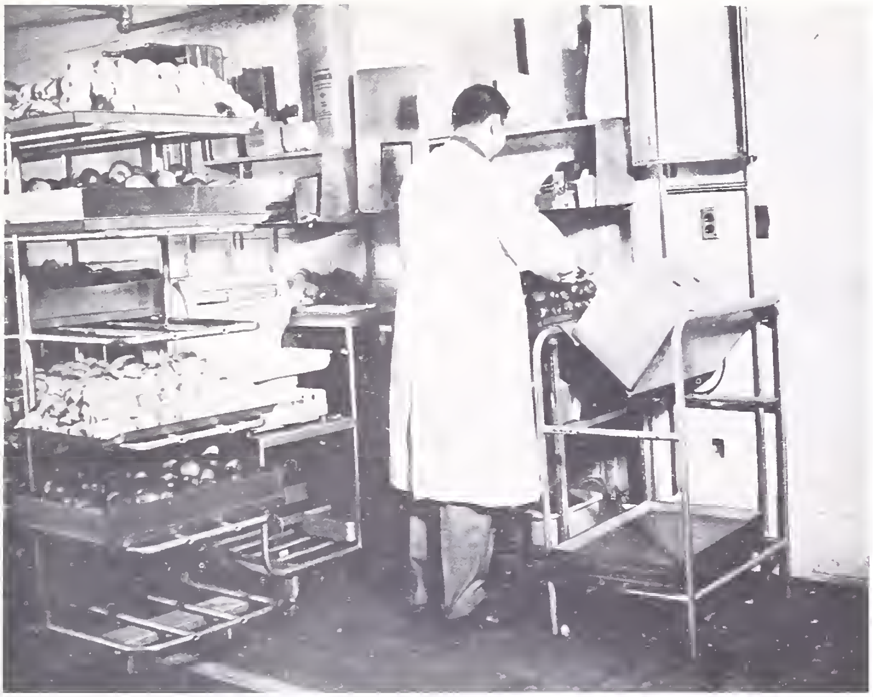
Since most produce will move directly to the displays once packaging and pricing are complete, pricing stations should be near the door to the sales area. Some temporary storage for finished products should also be provided in this area.

3. Provide an individual, easily accessible workplace for each production worker, with all the needed supplies, tools, and equipment within easy reach.

This can involve three types of operations. First, in the conventional bulk operation, some backroom work will be done, and a simple work table is needed which contains the materials used.

Second, in tray display of bulk produce, traying tables are needed 3/. Pans and collars should be stored at these tables (fig. 6).

3/ Tray display is the method of preparing trays of merchandise in the backroom and placing the entire tray into the display counter.



BN-17980-x

Figure 6.--A work station for preparing trays of bulk produce for tray display.

These stations can also be used for regular backroom production, such as working strawberries.

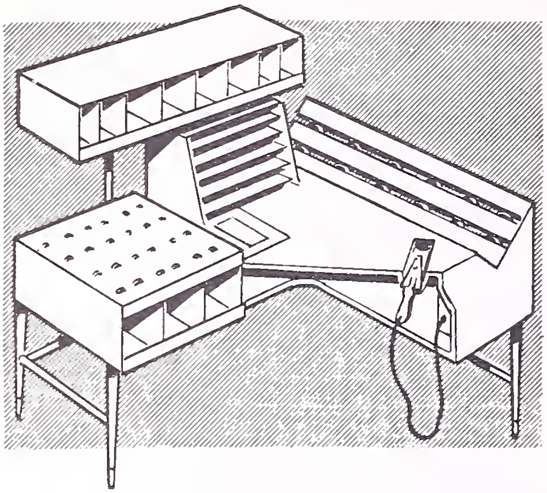
Third, packaging workplaces and a weighing station are needed in a produce packaging operation, whether it uses tray display or not. A separate bagging and weighing station may also be needed for bagging and banding (fig. 7).

4. Use tables with a work height of 38 inches for the average operator, adjustable up or down, with stools for alternate sitting and standing.

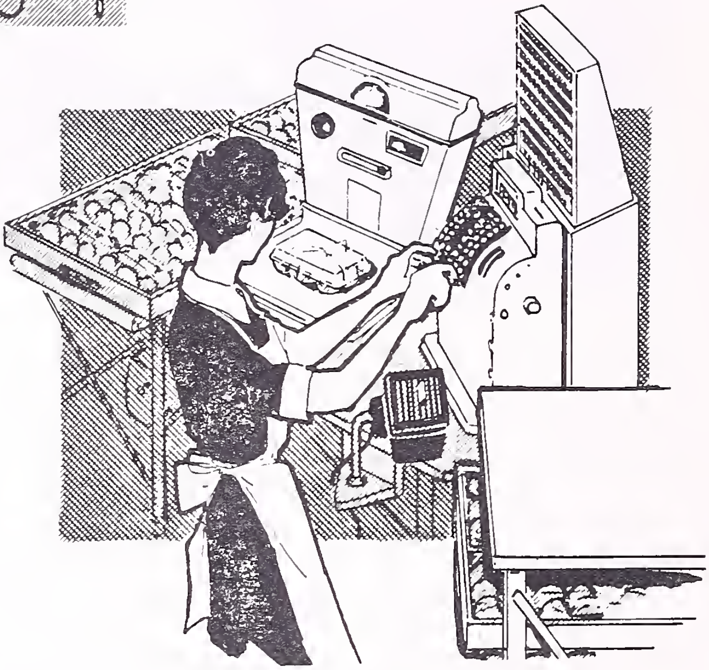
Most of the equipment designs illustrated can be used with stools. Care should be taken to keep the area under the table (the foot stand and knee arch) unobstructed. Backs on the stools are recommended. Trimming and bagging are two operations where, due to the type of work, it is usually desirable for the operator to stand.

5. Arrange the workplace so the operator can reach the unprocessed produce and dispose of finished product without leaving the station.

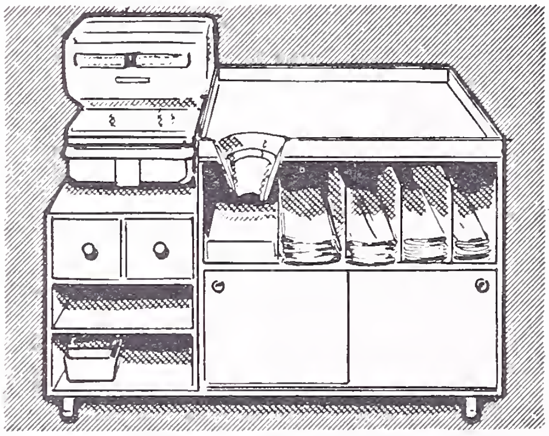
In prepacking operations, the holding shelf provides the means of moving the product into position. Conveyors feed the product from the packaging station to the scale (fig. 8). In tray display operations, unworked boxes of produce should be stored on a handtruck and loaded trays stored in carriers, close to the table.



"Redi reach"



Scale workplace.



Bagging table.

Figure 7.--Improved work stations for wrapping, pricing, and bagging produce.

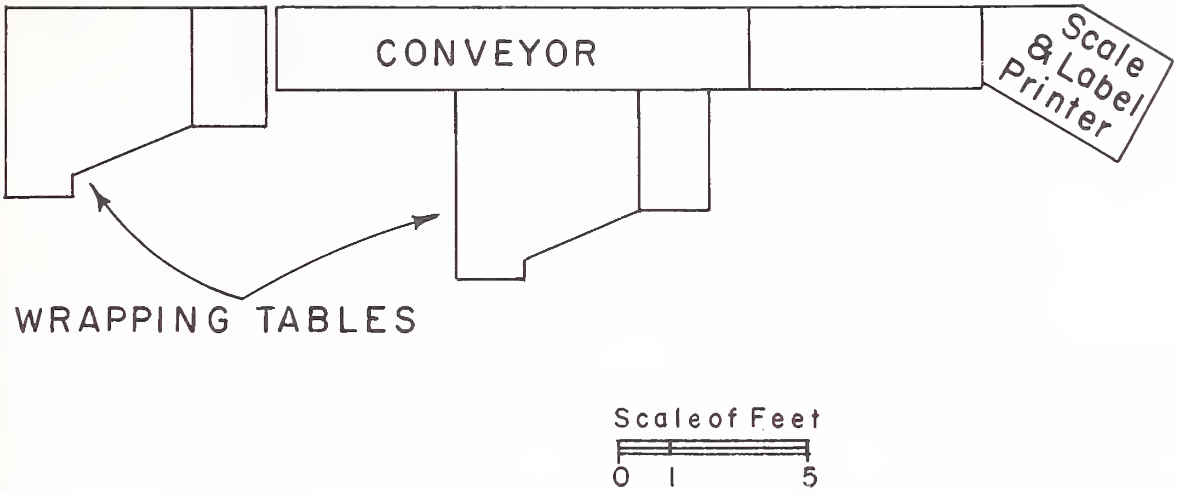


Figure 8.--A prepacked produce production line using conveyors and improved work stations.

6. Provide adequate accumulation space before, after, and between packaging and scaling operations.

When packaging produce with the "redi-reach" table (fig. 7), holding conveyors can be added to increase the number of boxes that can be accumulated at each table. The quantity depends on the ability of female employees to lift the boxes or the frequency with which clerks can service the area. Male crew members can position and open the boxes in advance if extra space is provided. This is one way of scheduling production. Conveyors between packers and scales need to be adequate to provide sufficient backlog for the scale operator. Excluding trays in working position, about one tray or flat space per $1,000 of sales is optimum [4]. Dollies or carriers used after weighing or traying should be easily moved when full, to permit new carriers to be moved into position.

7. Provide conveyors or dollies to transport the product to the next operation.

In the produce packaging operation, conveyors feeding to the scale are used to move and store loaded pans or flats. Packaged and priced produce is returned to these containers positioned beside the scale or on a low dolly, special shelf, or conveyor. Full containers are placed in carriers or dollies or stored on a holding conveyor for clerks to handle later. All conveyor heights should be adjustable. The amount of fall should be from $1\frac{1}{2}$ to 3 inches per 10 feet of conveyor.

---

[4] Pans or flats are used in this publication to indicate 18- by 27-inch containers for bulk or packaged produce. Dollies are wheeled racks in which pans or flats are placed to be moved. Carriers denote dollies which hold more than one vertical row of pans. These usually have open sides, making it easier to position or remove pans.

8. Arrange workplaces so that the sequence of motions provides maximum utilization of both hands.

Production workplaces illustrated were designed to be used with the most productive work methods. Supplies should be located conveniently for the operator.

Retail-Store Produce Bagging

Not every store needs facilities for bagging produce. The general-purpose bagging and scale table shown in figure 7 has many uses, and is designed primarily for small-lot bagging, banding, or direct pricing jobs. This work station is often included in the prepacking line. Some principles for efficient bagging follow.

1. Locate the bagging station adjacent to the primary source of produce.

The amount and type of produce to be bagged varies widely between firms. In some cases, most of the product comes from dry storage, and the bagging table or machine should be located in the dry storage area, preferably away from a major traffic aisle. When skids or pallets are used, locate the bagging station so that a skid slot for unbagged merchandise is on one side and a slot for bagged merchandise on the other. In other situations, large amounts of vegetables and fruits may be bagged, and bananas and some trimmed vegetables may be weighed at this table. If there is to be much trimmed produce moving to the bagging table, or if many bagged items are catch-weighed on the prepacking scale, the bagging table should be in the prepacking line.

2. Allow space for multiple dumping.

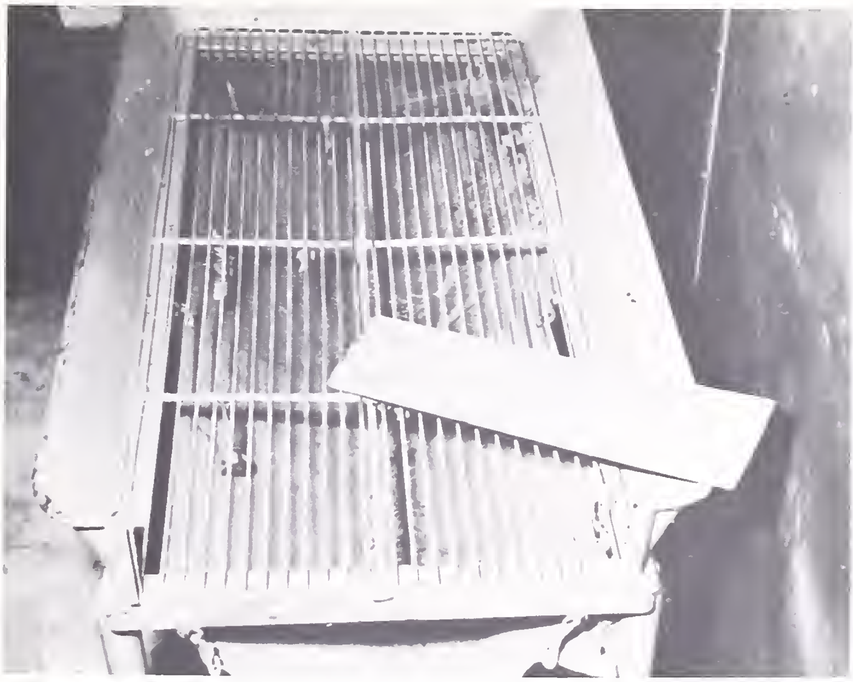
One type of dump hopper on bagging machines provides for both cleaning and multiple dumping (fig. 9). This device can also be used to clean and sort the produce. A shelf on the edge of the regular hopper is useful for smaller quantities. A clerk can bring several sacks on each trip, fill the hopper, and leave open on the shelf one bag which can be easily emptied into the hopper later; with this arrangement, women can do the bagging. The small bagging table should have space for at least one box or crate of merchandise.

3. Provide a holding area for bagged merchandise.

Skids or pallets, rolling display bins, or banana-box dollies can be used. Also, two pieces of strip conveyor can be mounted to lead full boxes away from the bagging station, reducing travel and permitting the use of women operators. With the small general-purpose bagging table, a parked handtruck can do the job adequately.

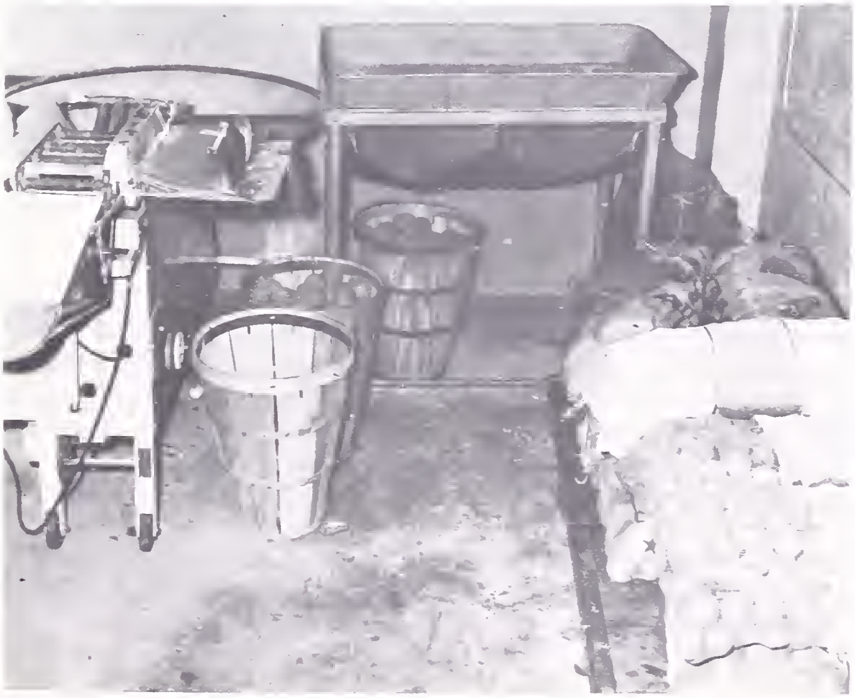
4. Position closing device close to operator and at a comfortable height.

Arrange the device so the operator does not have to take a step to close the bag.



BN-17976-x

Dump hopper with cleaning screen.



BN-17977-x

Complete bagging setup, showing canvas trash catcher.

Figure 9.--Equipment for bagging potatoes and onions in a retail food store.

5. Provide storage for bagged merchandise ready for display, if possible.

Rolling display bins best fill this requirement. The package can be filled, closed, and placed directly into the display in one operation. Nesting-stacking tubs of a convenient size [5], or even banana boxes, work well in smaller operations.

6. Provide storage for pricing equipment and materials so they are ready for use.

Pricing equipment should always be handy. Keep unused bags in special or original containers with the tops cut off so materials don't get mixed. Special lifters may be purchased for bagging machines. These pre-position each bag for the operator.

Handling Salvage, Trash, and Garbage

Make allowance in the layout for storage and disposal of empty containers and trash and garbage. These items can cause considerable congestion if storage is not organized.

Empty shipping containers should be disposed of immediately. Unless these containers are properly handled, they soon accumulate and congest the entire department until productive work is greatly retarded.

1. Locate temporary storage for salvage near the point of origin.

In a conventional bulk-produce operation, storing salvage and trash near the entrance to the backroom is advised. In tray display or prepackaging operations, the collection point should be centered at the trim and production areas. If mobile handling equipment, such as skid racks, is used to store trash, the equipment can be moved outside to trash rooms, dumpsters, or incinerators when full.

2. Collapse all containers possible.

This is a space-saving step and applies particularly to wirebound wood crates. Corrugated cartons and trash wood boxes should be collapsed, particularly at weekends.

3. Segregate salvage and stack or nest neatly.

Provide separate space for each kind of salvage or trash, and if the item tends to spread (as trash does), provide a bin or container to keep it in place (fig. 10). Where salvage is tied in bundles, special tying racks can be used.

---

[5] Recommended size for tubs holding bagged produce for shipment from warehouse to retail store is 12 inches deep with a base 14 by 20 inches and sufficient taper outward to nest. These tubs should provide a means of stacking when loaded.

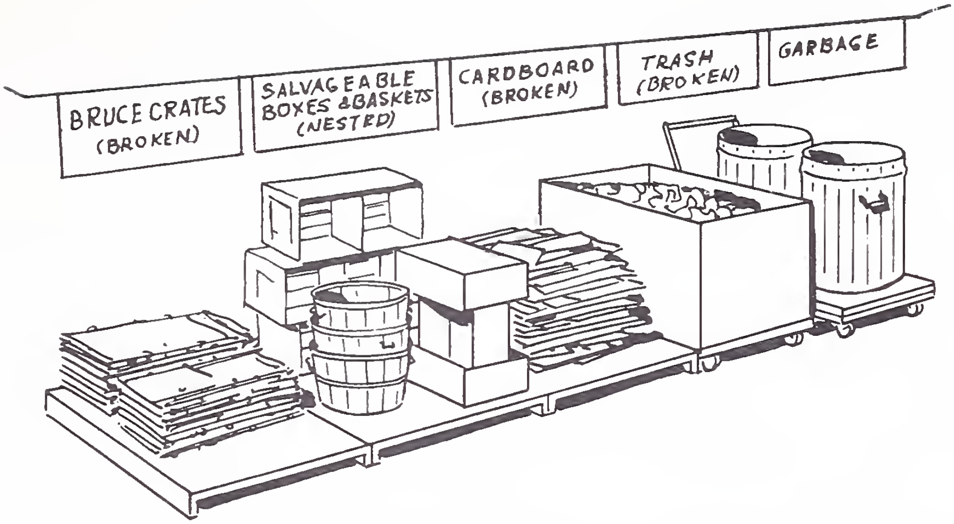


Figure 10.--Orderly storage of salvage, trash, and garbage.

PRODUCE DEPARTMENT DISPLAY AND CUSTOMER SERVICE AREA

Good layout in the produce selling area is extremely important to customer convenience as well as to labor costs. Principles developed from studies of produce display areas should be used in preparing produce layouts or rearranging produce departments (7). If the principles are properly applied, they can help to determine correct floor space and display arrangement that will yield a low labor cost and maximum produce sales per customer.

Display Counter Arrangement

1. *Locate the produce department early in the store's shopping pattern.*

Produce displays can be attractive, colorful, and inviting. Since most customers buy produce, good displays serve to start the customer to shopping. Also, produce is often one of the most profitable departments, and many retailers like to sell fresh produce in preference to canned or frozen. Produce sales as a percentage of total store sales are larger when the produce department is located first in the traffic pattern than when it is located last (7, p. 7). The produce department should not be blocked from the view of the customer as she enters the store.

2. *Design the department so traffic moves in one direction.*

More congestion is created when there is two-way traffic.

3. *Avoid secondary aisles and end displays.*

Most customers make only one trip through the produce department, and, as a result, it is difficult to get a high percentage of customers to enter secondary aisles.

4. Keep produce displays back from entrances and exits.

Customers tend to enter a store and move some distance before they start to shop. Any item located before the point where shopping normally begins may be bypassed by the customer. Displays near entrances, exits, or checkouts may be bypassed or become congested.

5. Design aisle widths that will be adequate to handle average peak congestion.

Space is needed for shopping. Crowded customers become impatient and move on to other less crowed areas of the store. However, if too wide an aisle is allotted, the customers tend to shop only one side of the aisle. Space should be adequate to permit some stocking during heavy shopping periods.

6. Use "specials" to pull customers into corners and "dead" sales areas.

Slow spots develop in any layout. Often these can be determined ahead of time and special displays prepared to encourage customers to go to these areas.

7. Arrange the department to encourage complete shopping.

Department arrangements that expose the customer to all the produce return the greatest sales. Surround the customer with produce rather than aisles, and limit the "escape" openings that permit bypassing the department.

Location of Service Scale in Bulk Departments

Bulk produce departments with service scales for weighing produce have special traffic and congestion problems, created by the weighing and pricing operation (7, p. 25) 6/. While produce weighing can be done more economically at the checkout, when pricing is done in the display area customers can be serviced in such a department with a minimum of congestion and inconvenience if the following rules are followed.

1. Locate the station at the end of the typical produce department shopping route.

When the station is in the center of the produce display area, especially when in the center of an island, there is a tendency for the customer to want each individual produce purchase weighed immediately upon making the selection. It requires more time to weigh three packages at three different times than three in immediate succession.

2. Locate the weighing station so customers will not block either the aisle or a display.

If the station is located in an aisle, the aisle should be wide enough to accommodate the station and customer shopping carts, plus room for passage of other customers.

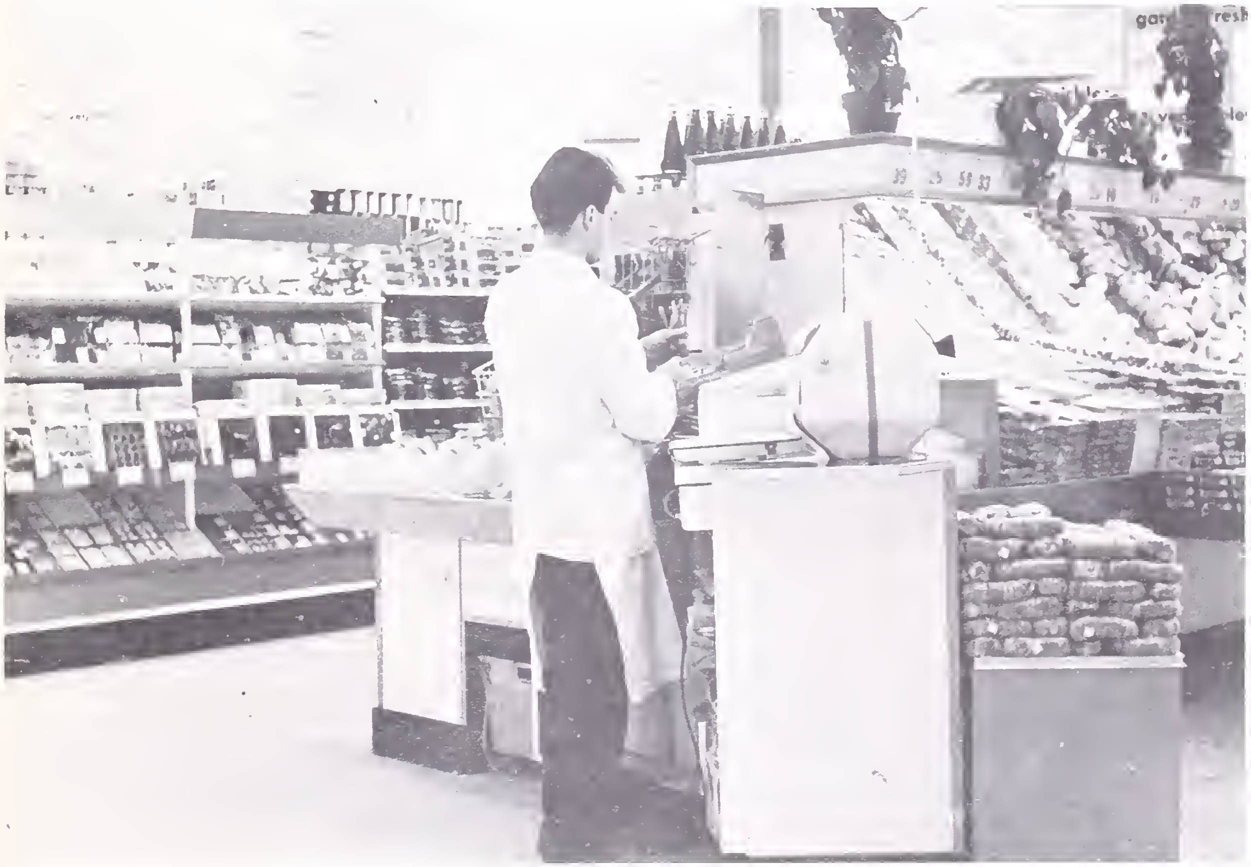
6/ This research indicated the lowest cost method of pricing bulk produce was with scales at the checkout counters.

3. Provide for a fixed workplace with the scale in one location.

This will eliminate the travel of the clerk from customer to customer or scale to scale and permit him to serve more customers (fig. 11). Multiple scales create clerk traffic and often delay rather than convenience the customers. One scale of the right type in the proper location can handle all but extremely high-volume stores.

4. Eliminate barriers between customers and scale.

If shopping carts or boxes block the customer from the scale, the clerk will have to move to the customer to obtain the package and go back to the customer with the weighed and priced package. It should be normal for the customer to move her shopping cart adjacent to the service counter. The customer should be able to read the scale when the package is being weighed. Angled reading devices are available for most scales.



BN-17978-x

Figure 11.--A customer service station designed to speed up produce weighing and provide workspace for slack periods.

5. Provide a shelf beside the scale to hold packages.

Many customers walk away from the scale to shop while their merchandise is being weighed. The shelf permits the operator to dispose of the package and to serve the next customer. This also encourages customers to place packages on the shelf while other packages are being weighed.

6. Work surface and scale platter should be at a convenient height.

Between 36 and 39 inches from the floor is satisfactory, with the scale dial above the platter and correct for parallax. This keeps the operator's hands at a comfortable level and does not obstruct his view of the dial.

7. Locate tools, materials, and equipment close to or directly in front of the operator, with tools pre-positioned whenever possible.

The automatic stapler and tape dispenser should be in fixed positions, with a definite and fixed place provided for all tools and materials. The pencil or pen used for pricing should be in a holder at the scale. Extra bags for loose items should be near the scale and readily accessible. A waste can should be provided at the station.

8. Provide a work space for odd jobs.

Due to the small amount of time required for serving customers, there is considerable idle time unless jobs are assigned which the clerk can do when waiting for customers.

DEVELOPMENT OF A COMPLETE PRODUCE DEPARTMENT LAYOUT IN A NEW STORE

In developing a complete layout, certain key operations should be located first, and the others positioned in relation to these. The following steps illustrate the procedure for layout and can help to prevent error due to omission of important factors.

Step 1: Establish the Expected Volume

Produce volume is usually represented as a percent of store sales. For example, a store with an estimated weekly volume of $45,000 to $50,000, with produce representing an average of 9 percent of store sales, would allow for a $4,000 to $4,500 produce department. Seasonal peak sales also should be determined; if comparable stores had a peak produce percent of store sales of 11 percent, the highest estimated sales for this department would be approximately $5,500 per week.

Step 2: Decide on the Methods of Operation to be Used

The key to good layout is to know, ahead of time, the procedures which will be followed in operating the department. The following should be known: Methods and equipment for receiving; whether the produce is to be prepacked or bulk; the amount of packaging to be performed; and whether tray display or conventional display methods are to be used. It is essential also to know the work methods for each of the functions performed, in order to select or design the right equipment for the job. It is desirable to meet with supervisors and merchandisers, as well as store-level management or training personnel, to determine these factors.

For illustration in this report, a department selling prepacked produce was assumed, with some items priced by units, and potatoes, onions, some oranges, apples, and grapefruit received packaged. This store would handle the normal amount of items packaged at terminal or shipping point, and would package in the store only that merchandise which is necessary to obtain fully prepriced or price-coded displays. Work methods would be generally those recommended in USDA publications.

Step 3: Determine the Location of the Produce Department and the Approximate Area Needed

First, determine the approximate sales area of the store. Assume the store discussed is assigned 11,500 square feet of rectangular selling area. Produce department location in relation to shopping patterns varies considerably according to firm, region of the country, or personal preference.

Reasons for locating produce early in the shopping patterns are: (1) Produce sales as a percent of store sales are highest in this location; (2) produce has a high potential net income when operating costs are controlled; and (3) a good produce department near the entrance of the store creates a desirable atmosphere.

Assuming produce is located first, with meat at the back of the store and with delicatessen and dairy departments on the perimeter, the store would have a one-way traffic pattern ending at the dairy department (fig. 12). From this point, the customer has a choice of shopping nonfoods or groceries. A department next to the produce cases, to encourage complete shopping by bringing the customer back across the store, would help complete the pattern. Frozen food and ice cream might be placed here. When the general location and shape of the produce area are determined, it is possible to consider the produce layout problems independently.

Calculation of Sales Space

Methods of allocating counter sales space for a produce department are usually based on experience. For example, size is determined by increasing or decreasing the space on the basis of the firm's experience in similar stores. Another system involves a projection based on volume of expected business per lineal foot of case. Dollar sales per lineal foot recommended by different firms range from $20 to $25 at volumes of less than $1,000 a week, to $100 at volumes of $8,000 to $10,000. For most supermarkets, the operating range is from $20 to $60.

680221 O - 63 - 4

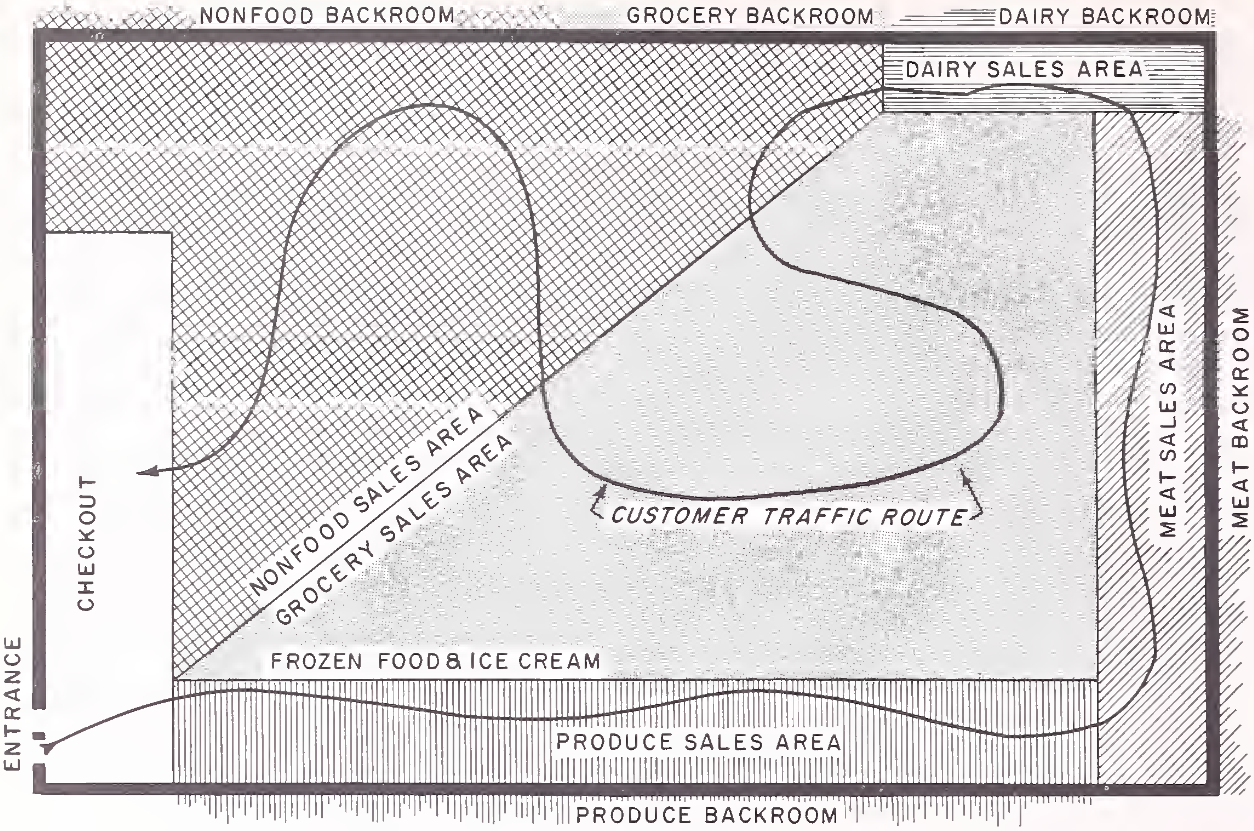


Figure 12.--Sales area of a store showing location of departments, major customer shopping route, and backroom locations.

Other techniques sometimes used are based on display turnover. For instance, a store with weekly produce sales of $5,000, with $500 worth of produce displayed on the counter, would have 10 turns per week. This method may also be based on containers, by calculating the average retail value of a case of merchandise. In order to translate turnover figures to sales space, a set amount of shelf space must be assigned per dollar or per case.

With an average depth of displays of 2 to 3 units, about 13 to 14 lineal inches of a 36-inch-deep display are required per case of produce, about 3 to $3\frac{1}{2}$ lineal inches of display per dollar. [7] Recommended turnover figures based on cases range from 8 to 14. One weakness of the turnover system for produce is the great variation in quantity on display throughout the week. Fourteen turns on the basis of a minimum depth of displays would actually be much less than 14 turns on the basis of the average amount on the counter.

Another system uses the amount of merchandise needed to prepare a complete, but minimum, counter base. This varies from 7 to 15 percent of weekly sales. This is best done in cases of merchandise, with space per case as defined previously.

---

[7] Apples, oranges, head lettuce, etc., piled two to three pieces high.

All of the systems mentioned, however, lack some important considerations. In most produce departments, displays are built up throughout the week to anticipate sales peaks and to level out the use of labor. Also, a certain minimum amount of a product has to be shown in order to give customers a choice and present an attractive display.

Several factors should be considered in laying out a sales area:

1. The number of items carried and their volume in cases per week.
2. An adequate "spread" of product to show it to best effect.
3. Gross profit and net profit per item.
4. Perishability of product and shrinkage and spoilage loss.
5. Variation in daily and weekly sales, and seasonal variation in quantity and items handled.
6. Displays that can be maintained with a minimum quantity in slack periods.
7. Displays that can be "loaded" and maintained for peak sales periods.
8. Space for special displays or to accent regular displays.
9. Accessibility of displays to the customers, avoiding congestion.
10. Aisles adequate to service the department.

A system of calculating sales space taking into consideration the factors mentioned requires additional data on such factors as the items carried, their average weekly sales in cases, and the methods of displaying them (that is, on ice, in refrigerated cases, on dry racks, etc.).

Seasonal patterns of sales are useful, as some items are handled in a different manner when they are in season than when off season. The seasonal variation for the major classes of produce in one eastern firm is shown in table 1. While quantity in total cases does not vary significantly in this firm, except for one period, shifting between classes of commodities is significant, especially between soft and hard fruits. 8/

The following method of determining sales space takes into consideration many of these factors. First, segregate the major classes of commodities according to display method. Separate items to be displayed on the wet rack or refrigerated rack from dry-rack items. 9/ Consider separately potatoes and onions, plants and flowers, dried fruits and nuts, and other specialty products.

8/ "Soft" fruits include such fruits as ripe peaches, grapes, strawberries, etc.; "hard" fruits include apples, pears, pineapples, etc.

9/ An "item" refers to any separate display. For instance, cantaloupes might be graded into three sizes at three prices. This would represent three "items."

Table 1.--Average percent of total cases of produce moved per week, by commodity class and season, in one East Coast retail firm

Season	Trimmed & wet-rack vegetables	Nontrimmed vegetables	Hard fruit, melons, & citrus	Soft fruit & bananas	Potatoes & onions	Miscellaneous	Total cases to yearly average
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Winter 1/..	29.1	14.3	29.9	7.1	18.7	.9	98
Spring.....	35.7	12.0	26.8	9.8	15.3	.4	96
Summer.....	25.2	12.8	19.1	28.7	13.9	.3	112
Fall.......	29.4	14.9	27.6	9.4	17.2	1.5	94
Yearly average	29.6	13.5	25.6	14.3	16.2	.8	100

1/ December, January, February (calendar months).

Determine for each item the amount of surface display space to allow. The tray handling system is useful here to help make these calculations. One average box of merchandise requires one tray, a space 18 by 27 inches. The equivalent in counter space would be 13½ lineal inches of a 36-inch-deep counter, or about 3½ square feet of surface. Any item which sells in quantity needs a minimum of one tray, to prevent handling large numbers of part-cases. Faster movers need two or even four trays. Slow movers should be given less space, although one-third tray (9 by 18 inches or its equivalent) is about the minimum space any produce should be given. A few items can be "mixed" to reduce the space required; for instance, packaged soup greens, water cress, and parsley, jumble displayed in a plastic tub.

To illustrate this technique for the sample store, assume an average of 42 items to go in the salad vegetable rack, requiring a total of 40 tray spaces or their equivalent in counter space (3½ square feet per tray space). Dry-rack items and fruit that may or may not require refrigeration, totaling 31 items, require 38 tray spaces. Potatoes and onions in special displays average seven items which can be handled in four rolling display bins 30 inches wide (8). 10/ This is the equivalent of about eight trays. 11/

This provides a complete produce department with a total of 80 items carried, excluding plants, flowers, and miscellaneous. Four tray spaces for dried fruit and nuts are provided by substituting these seasonal items for out-of-season items. The number of tray spaces and the lineal feet of displays allotted are shown in table 2. Items carried by stores, however, might range from 60 to 120. These also are represented in table 2.

10/ Rolling display bins are mobile bins filled in the backroom and moved to the display area and parked. Merchandise is sold directly from the bins.

11/ This technique is presented to illustrate a procedure for analyzing space layout on the basis of a number of factors. The judgment as to space to allot each item remains with the person doing the individual layout. Guide lines given are those that proved effective in tray display installations. The U. S. Department of Agriculture is continuing research in this area.

Table 2.--Hypothetical allocation of display space for a $4,500-a-week produce department with various numbers of items carried for sale 1/

Type of display	Number of items carried							
	60		80		100		120	
	Lineal feet	Trays 2/	Lineal feet	Trays 2/	Lineal feet	Trays 2/	Lineal feet	Trays 2/
Ice or refrigerated display.....	40 1/2	36	45	40	49 1/2	44	54	48
Two-tiered dry-rack display.....	24 3/4	34	29 1/4	38	31 1/2	42	36	46
Potatoes & onions.	7 1/2	6	10	8	12 1/2	10	15	12
Total	72 3/4	76	84 1/4	86	93 1/2	96	105	106
Sales per lineal foot (dollars)...	62		53		48		43	
Turns per week 3/.		11.8		10.5		9.4		8.5
Percent of weekly sales for basic setup...........		8.4		9.6		10.7		11.8

1/ This table illustrates the use of the technique only. The percentages given to various displays will vary, depending on merchandising procedures. The figures represent a compromise, with soft fruit going into refrigeration, other fruit displayed without. Product mix is similar to that shown in table 1.

2/ One 18- x 27-inch tray or equivalent space on displays ($3\frac{1}{2}$ square feet).

3/ Merchandise necessary for a minimum display divided into weekly sales.

This amount of pan display area requires a salad vegetable rack 45 feet long (two 18- by 27-inch pans in a 36-inch-deep case equal 13 1/2 inches per pan). If the dry rack holds two pans on the main level, plus an overhead shelf one pan wide, it can be 29 1/4 feet long, plus 10 feet of potato racks. Double-decking of displays can be done by locating dry displays one pan wide at a second level above the case. Also, some dry displays can be put on extenders in front of the cases. Displays can be placed below dry-rack cases, and some of the new refrigerated racks provide multiple-deck shelving. Aisle displays, however, are not generally recommended.

In this store, wet or refrigerated displays can be put on the wall, with the dry display rack across an aisle on one side of a gondola. Specials can be located to start the customers to shopping and to pull traffic to otherwise "dead" areas. Potatoes, onions, and other items should be placed on dry racks or movable bins at the end of the department (fig. 13).

Calculation of Aisle Space

Produce sales are affected adversely when an excess of customer congestion occurs (7). One method of determining aisle space adequate to minimize congestion is to calculate the number of customer groups at normal peak sales periods, and allow 15 to 25 square feet of aisle space per customer group. 12/

12/ If the normal peak on weekend periods (busiest 2 or 3 hours) was 24 customer groups in the produce department and the department was 45 feet long, the aisle space with 20 square feet per customer would be 10.7 feet.

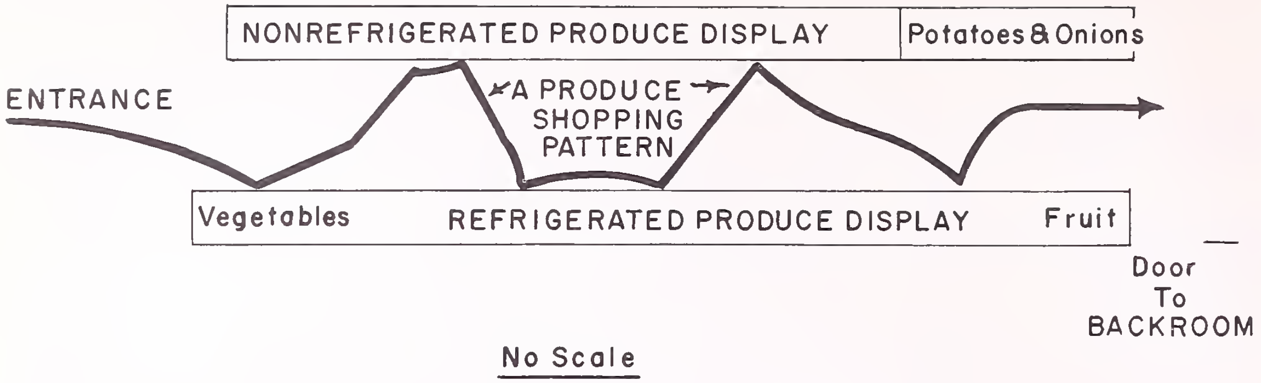

NONREFRIGERATED PRODUCE DISPLAY
Potatoes & Onions
ENTRANCE
A PRODUCE SHOPPING PATTERN
Vegetables
REFRIGERATED PRODUCE DISPLAY
Fruit
Door To BACKROOM
No Scale

Figure 13.--Produce sales area with display cases.

This procedure gives an aisle width for use without islands, and covers an average situation in larger supermarkets. In smaller volume produce departments, customers seldom were a major factor in determining aisle width. Aisles below 7 feet or over 12 feet are not recommended, since narrow aisles created passing problems for customers, and aisles that were too wide discouraged crossing of the aisle or "bounce" shopping.

Step 4: Determine the Number and Kind of Workplaces, Handling Equipment, and Storage Space Needed

The amount and kind of equipment for a produce department should be determined by analyzing each job separately. Equipment requirements vary due to differences in methods of sale and volume.

Calculation of Number and Type of Workplaces

To determine accurately the number and type of workplaces needed, a knowledge of how the produce is handled is necessary. A problem in obtaining such data is caused by seasonal variations that change the handling methods (table 1). The percentages of cases of produce sold, by methods of packaging or pricing, for two bulk and two prepack stores are shown in table 3. The data on bulk stores are yearly averages and those for the prepack stores are for the periods noted. This table indicates the considerable effect that method of handling has on the equipment needed and the necessity of obtaining such data before preparing a layout. A knowledge of the various produce-handling techniques is essential.

It may be necessary, in a small market, to provide nearly as many workplaces as in a large market. Even though there are fewer workers in a small market, some will have dual jobs, performed at different workplaces. Differences in methods of preparing the products, in materials used, and in worker productivity make it difficult to determine exact standards for each worker; but to maximize production, each worker must have a well-arranged workplace. The number of workplaces should be based on what the average worker can produce; therefore, standard figures for the various produce jobs are of help in determining the number of workplaces.

Table 3.--Percent of cases of produce sold, according to method of packaging or handling, for four supermarket departments

Method	Bulk stores		Prepack stores	
	A	B	C 1/	D 2/
	Percent	Percent	Percent	Percent
Packaged before arrival at store	24.3	28.6	23.8	10.3 3/
Overwrap, with tray	.1	.0	2.3	14.0
Overwrap, no tray	.0	.0	14.7	18.8
Sleeve wrap	.0	.5	6.0	2.7
Bag	1.0	.5	26.5	16.4
Film cap and rubberband	1.8	2.4	.8	3.0
Weigh and price on item	9.5	4.3	14.2	7.0
Price on item without weighing	15.4	14.1	- 4/	26.6
Code or no price	30.0	25.8	11.7	.3
Price at customer service scale	17.9	23.8	.0	.9
Total	100.0	100.0	100.0	100.0

1/ Month of January.
2/ Month of August.
3/ Most potatoes and onions received in bulk.
4/ Included in "code or no price."

One trimmer working 40 hours, with good work methods, can do all the necessary trimming for a weekly produce volume of $14,000 to $16,000, depending on the amount of price-marking included. 13/ Therefore, one trim station should be adequate for most supermarkets; however, some markets with $10,000-a-week volume may desire an auxiliary trim workplace for busy weekends or for certain peak seasons. This area can be used to trim corn when the disposal unit will not handle the husks. Automatic trimming machines could be expected to save 1/4 to 1/3 hour of labor for every $1,000 of produce sales, and would increase the volume one man can handle by about $2,000 a week.

The requirements for packaging or production workplaces vary considerably, depending on the amount of packaging or backroom preparation work done in a particular store.

One wrapper in a 40-hour week can overwrap 3,000 packages, or sleeve-wrap 4,000 packages. Value per retail package in produce ranges usually from 25 to 35 cents. Therefore, an operator can overwrap $650 to $1,050 worth of produce

---

13/ The higher productivity does not include any pricing, bagging or packaging. The lower figure includes some pricing with paper-covered wire ties. Differences in the amount of trim and in items trimmed also affect productivity. The data include trimming and retrimming all salad items, lettuce, celery, cauliflower, and corn, and washing some bulk spinach or similar items.

a week, or sleeve-wrap $1,000 to $1,400 worth. Obviously, the quantity packaged determines the number of work stations. Whatever the wrapping methods used, one wrap station should be sufficient up to $3,000 and two up to $6,000 in weekly produce volume. One traying station for bulk tray display can handle up to $10,000 of volume for fruits and nontrim vegetables. Even a bulk nontray store needs at least one workplace for preparation of certain products such as strawberries. Some special jobs require special workplaces. Examples are banding bananas and slicing melons.

A prepacking scale operator can price and label 9,000 to 12,000 retail packages in a 40-hour week. In most retail prepacking operations, only a small percentage of all produce would be price-marked at the prepacking scale. Some items are sold unmarked and others are weighed or priced as packaged. One scale and label printer station should take care of most stores up to $10,000 weekly volume. Beyond this volume, an automatic scale printer may be required. Production with this equipment should be about 20,000 packages in a 40-hour week. In addition, in many stores an extra scale may be needed for bagging even-weight packages and for weighing bananas and other items price-marked directly on the items.

Bagging machines usually have enough capacity that one machine can handle any produce department. The normal amount of bagging done by hand may be done at one station if the operator uses a funnel. A special packaging funnel has been designed by Agricultural Marketing Service researchers for hand-bagging (12, pp. 34, 35). Sometimes bagging attachments can be used at the wrap station to provide a double-duty work station. For most produce departments, a combination scale and bagging station will serve for banding, hand-bagging, and several other miscellaneous operations. In many areas, potatoes, onions, assorted smaller sizes of oranges, apples, grapefruit, and other items are centrally packaged. Moving the bagging function to the central warehouse saves a considerable number of hours of store labor and reduces the space needed for retail backroom operations.

When pricing is done at the checkout counter, several service scales for customer use are needed in the produce department, plus one scale at each checkout. This system is more economical than weighing and pricing in the produce sales area. However, for bulk departments pricing in the produce department, one customer service station, properly located, can handle most volumes. To keep the number of packages weighed within the range of the station's capacities, many items can be banded or packaged and priced in advance at the station during slack periods. This makes better use of the operator's time (see fig. 11).

Number and Kind of Workplaces Needed

In establishing the number and kind of work stations for an individual store, one station of each type may be called for at any volume except where multi-use stations can be used. Produce volume of $2,000 a week or less may call for a trim station on one side of a packaging and bagging workplace, with a scale on the opposite side. This combination of equipment would work adequately for departments with one or two clerks. For stores with a larger volume of sales, it is desirable to separate these stations, with roller conveyors to allow their simultaneous use by several clerks. Separate bagging and packaging work stations also may be required.

If the volume is $3,500 a week or larger, extra wrap stations may be needed, depending on the amount of packaging.

For the store illustrated, at $4,500 a week, one trim station, two wrap stations, a scale station, and a scale and bagging table would be adequate.

Storage Space

The amount of storage space to allot to a store depends on the frequency of delivery, time of day of delivery, and quantity of inventory carried.

Storage space requirements in the cooler depend mainly on weekly sales volume, number of deliveries per week, and type and size of the receiving equipment. Table 4 shows the number of cases to be stored for various volumes of weekly sales, with two, three, and five deliveries per week. To determine the number of storage slots required, the number of cases to be stored, as indicated in table 4, should be divided by the number of cases required to give a full load for the various types and sizes of receiving equipment. The average

Table 4.--Cooler storage space requirements of retail produce departments in cases of merchandise 1/

Weekly sales volume in cases	Deliveries per week		
	2	3	5
	Cases to be stored	Cases to be stored	Cases to be stored
Cases 2/	Number	Number	Number
100	40		
200	80	53	
300	120	80	
400	160	106	64
500	200	133	80
600	240	160	96
700	280	186	112
800	320	213	128
900	360	239	144
1000	400	267	160
1200	480	319	192
1400	560	372	224
1600		426	256
1800		479	288
2000		532	320
2500			400
3000			480

1/ Select the type of receiving equipment and divide the average full load in cases into the number of cases for which storage space is needed. After determining this number of storage slots, allow storage space for handstacked cases equivalent to one-third of the amount provided on handling equipment.

2/ Basis of $5 per average case.

skid load capacity for different types of equipment is shown in table 5. Additional space equivalent to that for one-third of the cases kept on the equipment should be allowed for handstacked cases.

On the basis of $5 per case, the $4,500-volume store would have a volume of 900 cases, and, with 5 deliveries per week, would require cooler space for 144 cases. Using the 30- by 42-inch semilive skid which has an average full load of 16 cases, this requires 9 cooler storage slots, (144 ÷ 16) plus wall space for carryover.

Table 5.--Average skid load capacity of various types and sizes of receiving equipment

Type and size of equipment	Average skid capacity	Type and size of equipment	Average skid capacity
	Cases		Cases
2-wheel truck - 12" x 24"	5	Skid - 30" x 48"	21
Skid - 28" x 36".........	14	Skid - 30" x 60"	26
Skid - 30" x 42".........	16	Pallet - 40" x 48"	32

Dry storage space varies according to the delivery methods and products handled. Most retailers bring much of their dry produce into the store early in the week to help level out the workload. In general, dry-storage slots equal to two-thirds of cooler-storage slots should be provided for noncooler merchandise. In the illustration, six dry-storage slots should be provided, independent of work areas and storage areas for equipment and supplies and salvage.

Handling Equipment

Determination of the amount of handling equipment includes specifying the number and type of carts, dollies, carriers, and pans or flats for holding merchandise, as well as skids or pallets and rolling display bins. These needs can be determined from the proposed labor schedule and from the amount of storage and display space proposed.

For a prepack or tray display operation, storage and display pans or flats are required. The counter base in the example has been calculated as 78 pans. Pans or flats equal to one-third to one-half of this number are required for backroom handling--in the example, 25 to 40 pans or flats. This number of pans would be needed in a prepack operation. If tray display is used, pans equal to the full counter base also would be required--a total of 103 to 118. Also some half-size or odd-size pans for slow movers would be required. Of the total, about one-third would be flat wire baskets, and two-thirds metal pans.

Highboy storage space for trays should be enough to handle the accumulated advance production and counter-takedown produce at night. One-third of the case would be the normal amount removed at night, although this could be higher on weekends.

Space in racks, or preferably carriers, equal to 20 to 25 percent of display space, should be allowed for advance production. In the example, where tray carriers are used, a total of about 42 slots would be needed. One 6-tray carrier and three 12-tray carriers would be a good combination.

In addition, two handtrucks may be needed to bring boxes to the trim station and packaging tables and for displaying some bagged items.

It is usually wise to provide a few more skids than storage slots, as these are needed during seasonal peaks. In this case a surplus of three skids is needed. If 2 or 3 of these types of skids are to be used for salvage and trash, a total of 20 or 21 skids would be required. Two or three of these could be reserve dry-display bins in addition to those used at the display. To sum up, the store discussed would need the following equipment and space:

1 trim station
2 packaging tables
1 bagging table and scale
1 pricing station
4 highboys with space for 42 pans
2 handtrucks
80 18" x 27" pans
40 18" x 27" wire baskets
18 half-size pans or baskets
7 rolling display bins
18 semilive skids with two jacks

This equipment requires the following parking spaces:

9 skid slots in the cooler
6 skid slots in the backroom
3 slots for trash and salvage storage

Step 5: Locate the Area for Each Operation

Make an approximation of each work area in the layout. First, locate the door to the sales area (fig. 14). With one display on the side of the store, the door must be at the rear of the backroom unless an undesirable gap is to be made in the display.

Second, locate the receiving door. Two possible locations could be used. If a conveyor is used in receiving, this door location may be very important. A preferred location (location "a" in fig. 14) would reduce travel in receiving and minimize backroom travel. In some stores where other buildings are located parallel to the supermarket, it may be best to locate this door at the back of the store (location b). The receiving door location may be relatively unimportant if proper handling equipment is used, since only a limited number of trips per week will be made from receiving door to cooler. Also, in location "b" the receiving dock might be shared with another department.

Third, locate the cooler. This often requires special consideration due to the refrigeration connections. Primary consideration should be given to removing items from the cooler, as this is done more often than receiving.

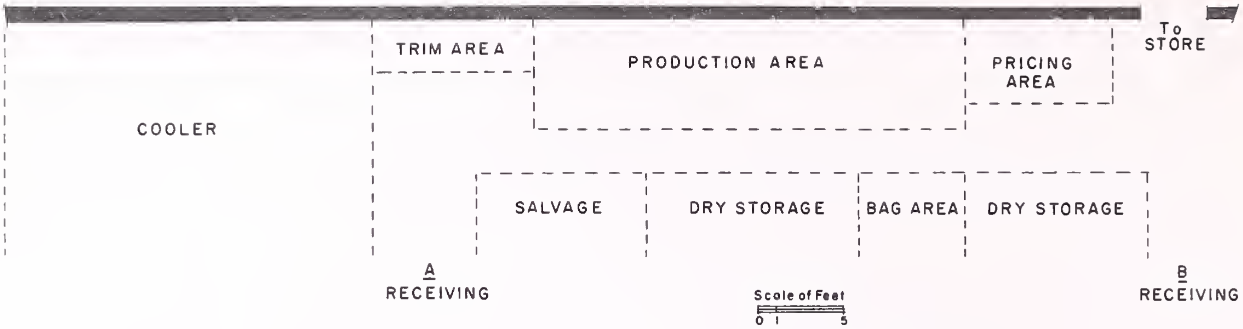


Figure 14.--A proposed produce backroom with work areas assigned.

Fourth, locate the production areas (fig. 14). Trimming should be near the cooler. The packaging line can continue down this wall, with salvage storage across the aisle. The bagging station is placed near the dry storage and the entrance to the store.

Fifth, locate storage areas for merchandise. Consider the major clerk traffic lines, from receiving to cooler and storage, cooler to trim, cooler to packaging tables, production and trim to salvage, scales and storage area to the display area, etc. Mark off the traffic lanes that will be needed.

Step 6: Fit the Work Stations, Handling Equipment, and Storage Into the General Areas, and Tie Them Together

In the cooler, one effective method of utilizing space is to place skids against the wall and use the area overhead for shelving (fig. 15). Once skids are placed, locate the cooler wall (see the formula for determining cooler size). The trimveyor can be placed on the outside cooler wall, with a sink in the corner. The area next to the sink is left for a tray carrier. In a prepack produce department, locate the pricing station near the entrance to the sales area.

The packaging tables and other work areas can then be located (fig. 16). Packaging tables can be placed along the wall, with room next to them for a lowboy cart for bringing merchandise from the cooler. On the right, space is reserved for a carrier. Conveyors connect the packaging stations and pricing station. Three pallet spaces, across the aisle, should take care of salvage and trash. Garbage cans could be kept at each work station. After the bagging table is located, the rest of the area is available for parking dry pallets or rolling display bins. A locked storage cabinet for supplies completes the backroom.

Step 7: Estimate Flexibility and Adequacy of the Department With Different Volumes of Business

In the example, the work stations are adequate for the estimated maximum volume of $6,000 a week. Additional volume can be handled by adding another packaging table.

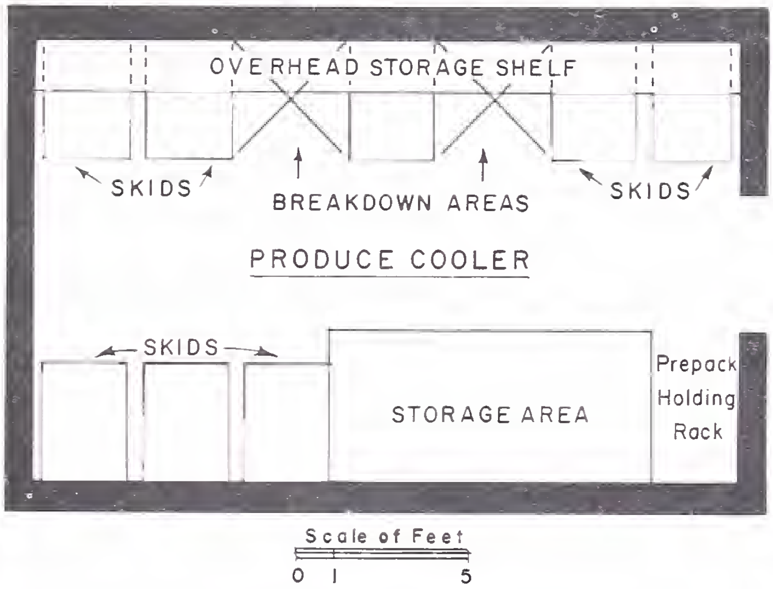


Figure 15.--Proposed produce cooler with storage areas marked.

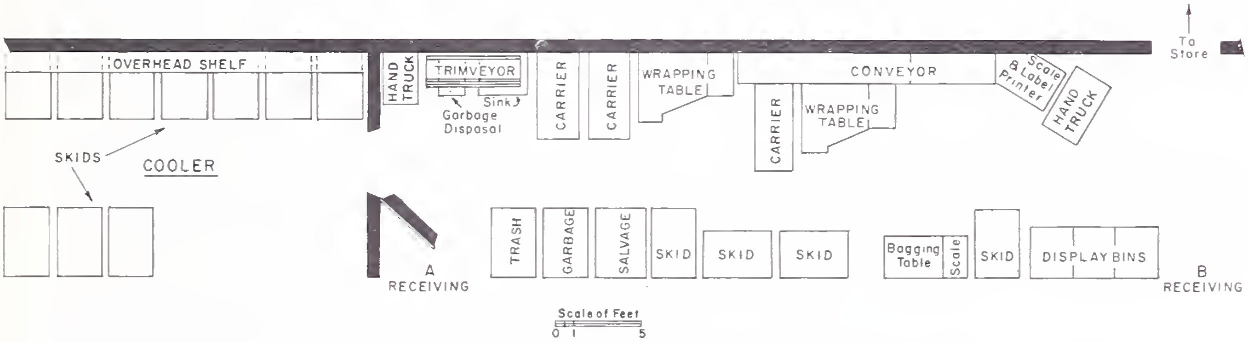


Figure 16.--Proposed produce backroom with equipment and workplaces.

Salvage and trash can be moved more frequently, making extra slots available for dry storage, with the back aisle available in an emergency. The cooler allows for some capacity in excess of present need.

Step 8: Plan Walls and Other Permanent Fixtures

When the layout is complete, determine the location of walls (fig. 17). The width of the backroom in this store will be set by determining the aisle width needed between the equipment. A 4-foot aisle width would give ample freedom to park a 30- by 42-inch skid, but skids sometimes overhang and take extra space. The limitation in this store is at the packaging line, where some carriers extend into the aisle. An aisle of 4 feet provides adequate space, even with these carriers in position. The aisle, plus packaging tables and conveyor and a 42-inch skid, gives a 13-foot net backroom. Then the rest of the walls can be drawn.

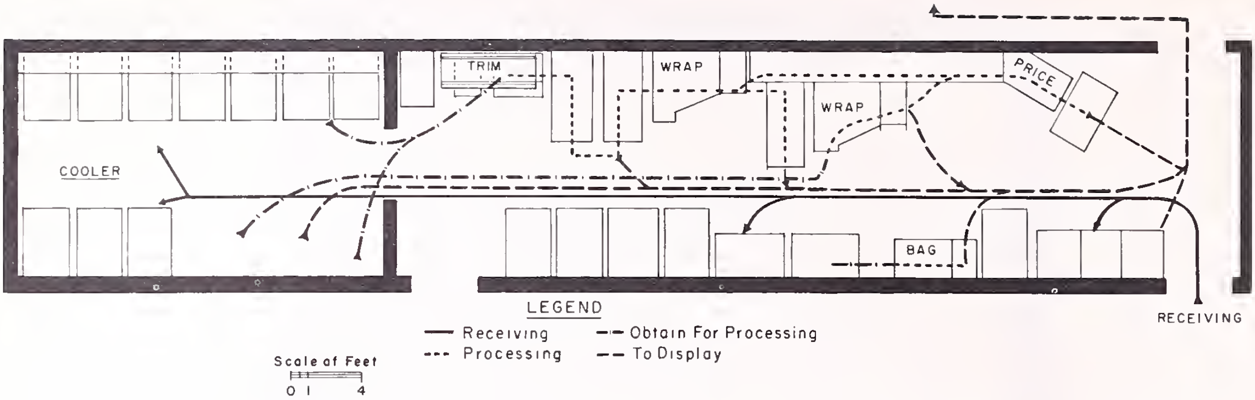


Figure 17.--Proposed produce backroom completed with flow lines to indicate movement of major classes of produce.

Step 9: Construct Flow Diagrams and Compare With Alternate Layouts

While the layout just described is complete, much checking still needs to be done, as there is a tendency to be satisfied too soon with any layout. Preferably, test it again with flow diagrams by drawing lines representing the movement of different kinds of product through the department (fig. 17). Compare it with alternate layouts. Sometimes it helps to put aside a layout for a time and return to it later for checking.

Step 10: Make Adjustments and Prepare a Final Layout

Even when the layout is drawn, compromises still have to be made when setting up the final store layout. The desired changes should be made in such a way as not to change the basic designs of the individual departments.

ALTERNATE LAYOUT SITUATIONS

Management should not attempt to copy the layouts given in this report unless the methods of operation are entirely the same as those illustrated. Although most firms may find it desirable to design different layouts, the principles of good layout should always apply. The layout shown in figure 16 was prepared for a prepacked produce operation. A similar layout is shown in figure 18 for a bulk operation. Only the traying area is changed. In place of two packaging tables and a scale station, this layout has a bagging and scale station near the door and two traying tables against the wall. No conveyor is necessary. In this operation, trimming and packaging work areas need not be joined. The extra traying table would probably be manned only during busy periods.

Some backroom space could be saved in the bulk operation, compared to a prepack operation, but this would make difficult a later conversion to prepack. The backroom situation just shown is for a long, narrow backroom, but this is not the best arrangement in all stores; there are many different backroom situations.

Two other situations that often occur involve a medium-depth backroom at the back of the store, or the use of two sides of a "wrap-around" backroom at one corner of the store.

A good example of the first type of layout is shown in the bulk tray layout in figure 19. This backroom would have to be longer for a prepack operation.

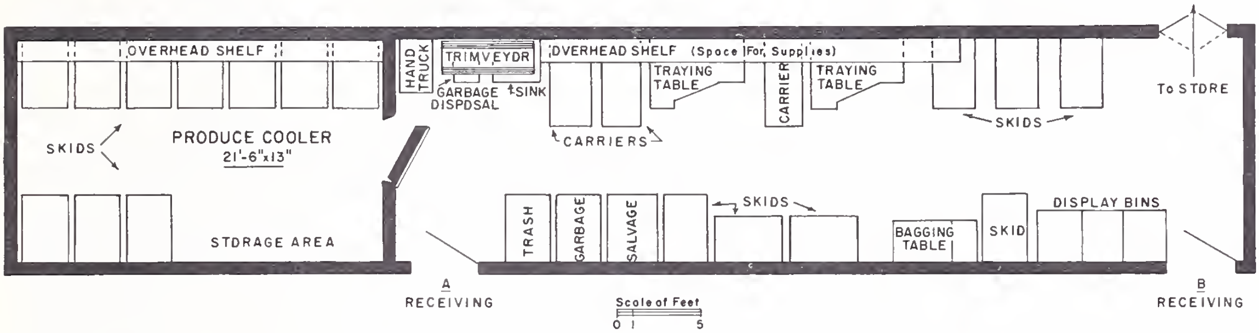


Figure 18.--Proposed produce backroom for tray display handling of bulk produce.

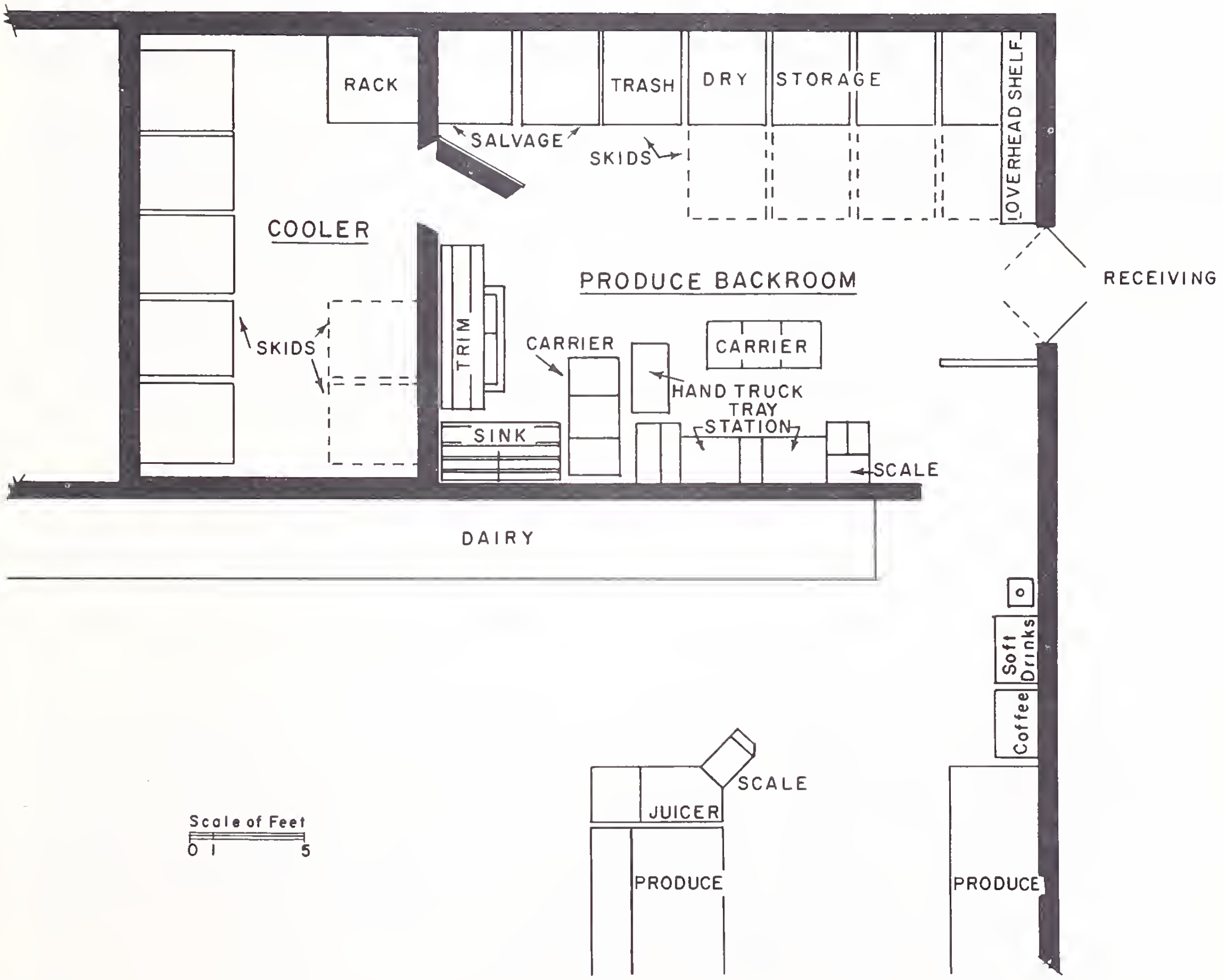


Figure 19.--A bulk produce backroom layout for a tray handling system with the backroom located at the back of the store.

Salvage, trash, and dry storage are on one wall and 42- by 48-inch pallets are used for receiving and storage. Workplaces for trimming and traying are along the inside wall, and feed readily to the sales area. The sales area extends along the side of the store, with a customer service station located at the end of the traffic pattern. Volume of this store would be similar to that in the one just detailed.

The second situation, or rear-corner design, is shown in figure 20, in which the store is designed to handle a smaller volume of prepacked produce. Semilive skids 30 by 48 inches are used for receiving and storage with 3-day-a-week delivery. The cooler extends part way across the back of the store behind the meat department, and the work area extends up the side of the store. If there is a storage room extending along the side of the store, the entrance to the sales area may be on the inside wall of the workroom. Salad items move directly from the trimming station to the wrapping station.

During slack periods, the two workplaces for trimming and wrapping may be manned, as needed, by one person. However, the wrapping station can also be used for other packaging, especially after the morning trimming is completed.

Another type is the refrigerated produce backroom in which no cooler box is provided (fig. 21). The same principles of layout apply here, except the storage locations can be placed next to the station at which the produce is worked. In this layout for a prepack operation, the packaging line is connected with a conveyor down the center of the room and feeds by a second conveyor to a scale near the door. The holding shelves for the trimveyor and wrapping station are made of the same tilted "V" conveyor. Trimmed produce is moved to the nearest packaging table for wrapping. Other items are loaded on the conveyor from the aisle. A bagging-pricing workplace is provided, separate from the packaging line. Bagged merchandise may be moved to the processing line scale for catch-weight pricing if desired.

Many other layout situations exist, since the layout should reflect the operating practices, equipment, and size of the store. The proper application of layout principles to each given situation will provide good produce departments regardless of the store design or arrangement.

PROCEDURE FOR REORGANIZING AN EXISTING DEPARTMENT

Applying the principles of layout and organization to an existing produce department often involves an entirely different set of problems than those encountered in laying out a new store. The operator must contend with walls or fixtures which cannot be moved or replaced, and often has to accept inadequate or poorly arranged space for the produce operation. Often, however, an operator can, within the space available, make tremendous improvements in layout arrangement and equipment at little expense. The following points help solve the principal difficulties in produce operations (1).

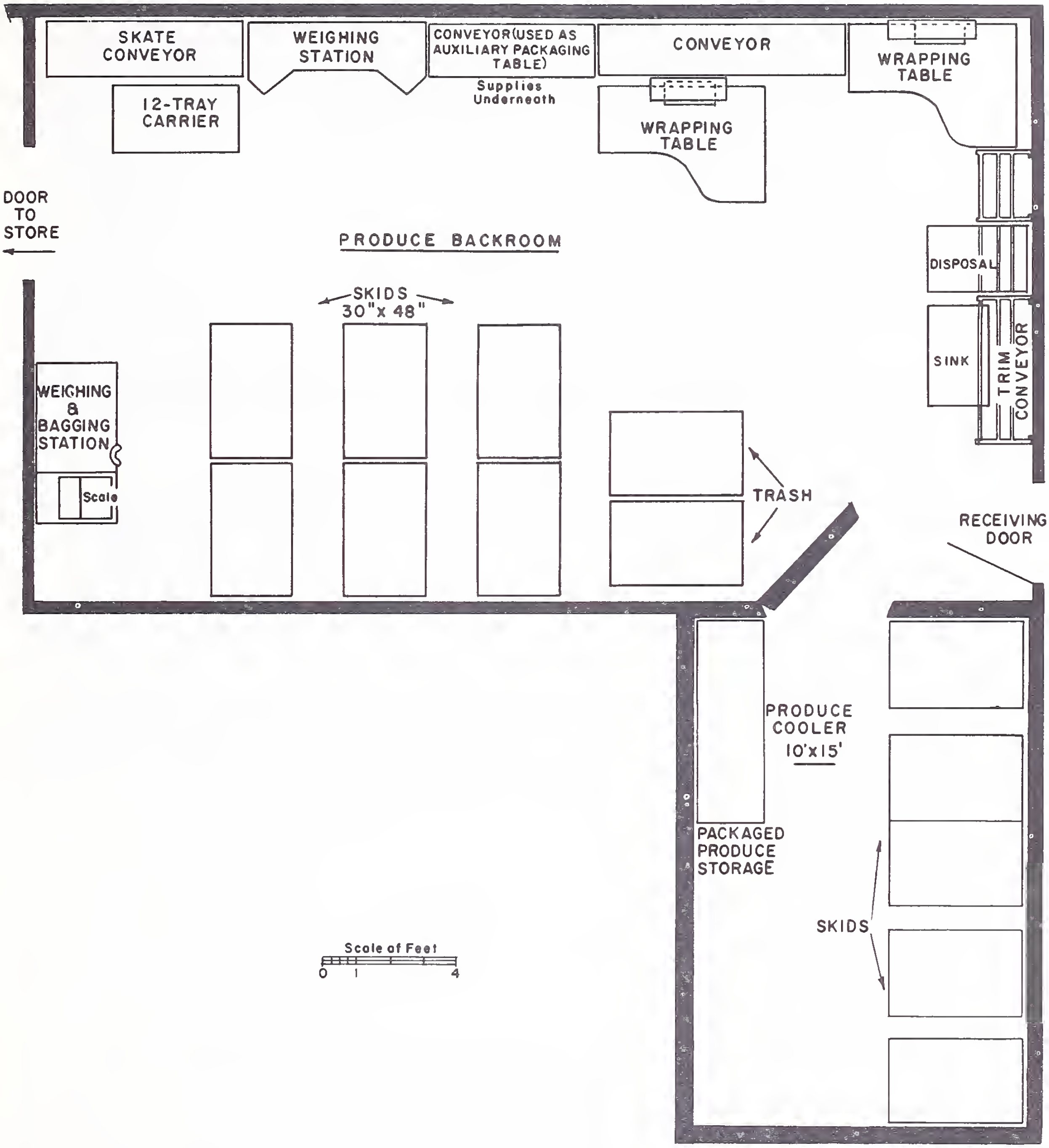


Figure 20.--A prepack produce layout with the backroom located in an "L" shaped area at the rear corner of the store.

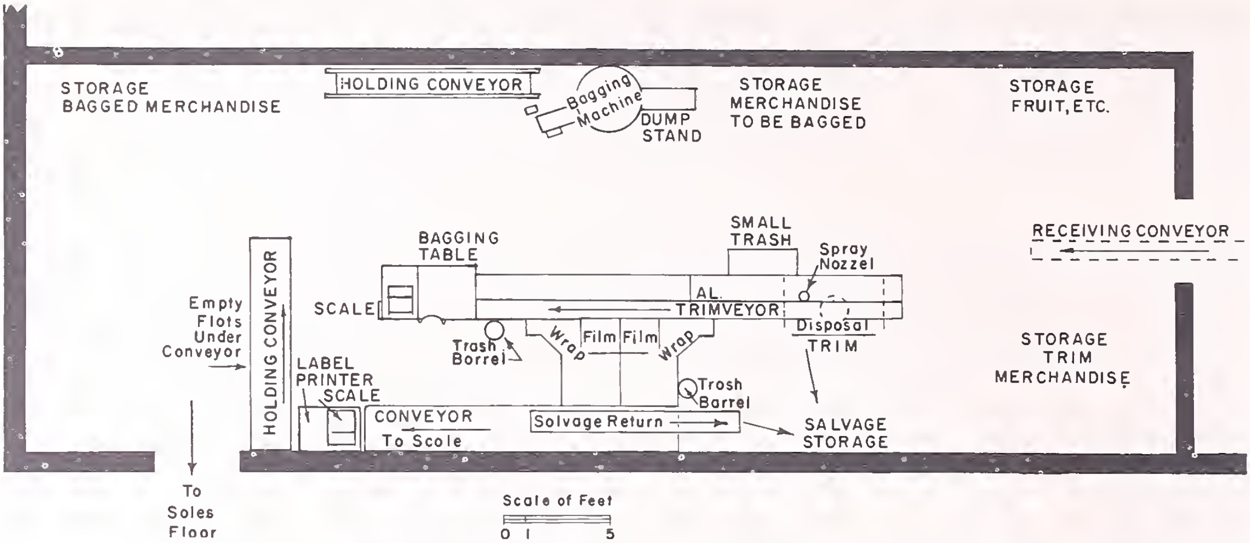


Figure 21.--A prepack produce layout for a refrigerated backroom with no cooler.

1. Adequate backroom space.

It is not always possible to obtain adequate space for produce in older stores, although in many cases space is available if consideration is given to use and need. A reallocation of space used by other departments will often produce a better overall store layout and can be a major help to the produce department. The space available is often better utilized if temporary partitions or fences can be set up to define the produce department area. Some ways to make the most of inadequate produce backroom space are:

a. Increase the number of deliveries.

b. Increase display capacity (double-deck cases).

c. Move products directly from receiving area into display.

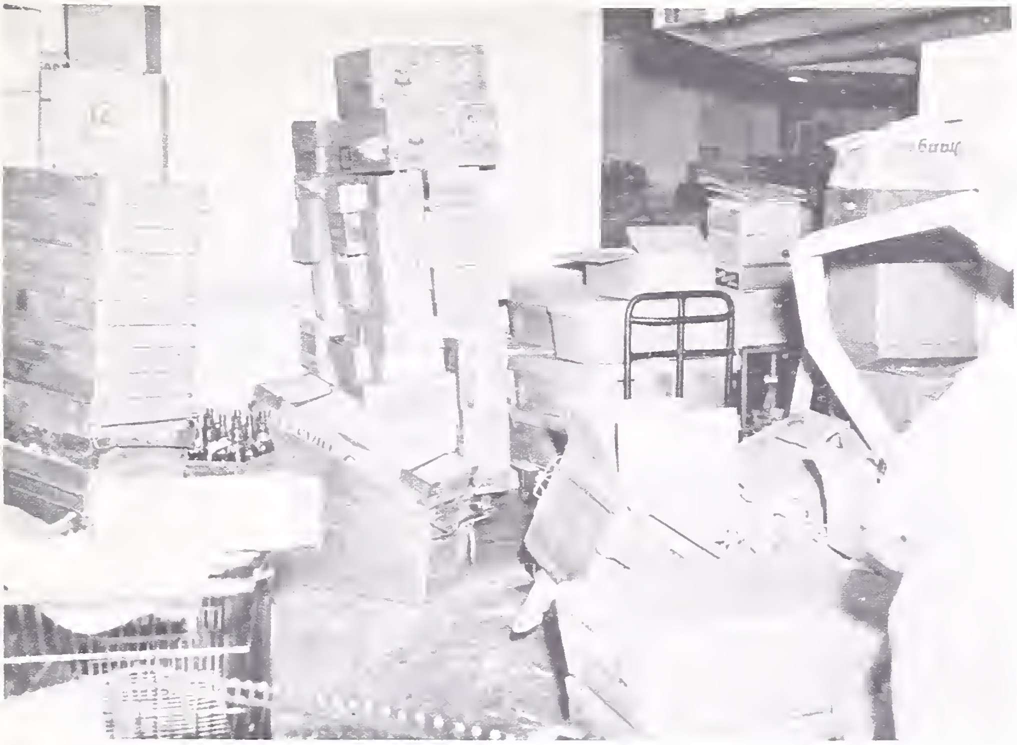
d. Process or package at warehouse or buy items already packaged.

e. Provide workplaces that can be used for several purposes.

f. Provide racks, shelves, and overhead storage areas.

g. Reorganize the space on hand.

Reorganization of the present space is often the most important. There is a tendency for produce backrooms to be used as a dump area for all the unwanted and unused materials, supplies, special display cards and frames, seasonal merchandise, and other items kept in long-term storage. Much of this material originates from produce, although all too frequently it belongs to other departments (fig. 22).



BN-17979-x

Figure 22.--A produce backroom in need of reorganization.

Since most produce backrooms are limited in space, surplus storage cabinets, shelves, sinks, or tables serve only as space wasters and junk collectors. Since there are frequent deliveries to the store, there is no reason to maintain large inventories of produce supplies, such as bags or twistems. Only such supplies and materials as are used regularly should be stored in backrooms. Special areas should be designated for frequently used items such as display cards and shelf extenders. All other materials should be disposed of elsewhere or returned to the warehouse. Seldom-used tables, cabinets, or shelves should be removed. Sinks, particularly, have been found to be excessive in size and number in most backrooms.

2. Adequate aisles and passageways.

Narrow doorways in high-traffic areas, tables and cabinets so located that they interfere with the easy flow of traffic, workplaces or areas that tend to infringe on passageways, and special displays that keep customers away from main displays cause bottlenecks in the flow of traffic through the department. These restrictions waste time, hold up the flow of work, and, in general, lead to a slowdown of effort as the day passes.

Whatever steps are required should be taken to remove these obstacles and keep them removed so the whole backroom and sales area is opened up for the easy and unobstructed flow of traffic. Narrow doors which delay traffic should be widened even if the cost is fairly high. Such temporary changes as hinging door jams on one side are seldom satisfactory, and, preferably, new, wider doors should be installed.

3. Floors all on one level.

Correct irregular floor levels or obstructions to the use of rolling equipment. Particular attention should be given to the floor at the receiving door and at the cooler door, where a split level could cause unnecessary hard labor when heavy loads on skids are received. Since a great amount of merchandise is moved on handtrucks or skids, any obstruction in the floor causes prolonged irritations, delays, and fatigue.

Ramps can be used, but should have a gradual rise and should have a non-slip covering to help minimize accidents. In some cases, it may be better to raise whole sections of floor to permit use of rolling equipment throughout the department. Some retailers who had built-in raised cooler floors have removed the floors with little noticeable loss of refrigeration.

4. Proper storage space for merchandise.

Improper and unplanned storage of merchandise causes considerable waste of time and effort in the produce department. The first consideration should be given to providing space for storage in the backroom and cooler, on skids or pallets, of the store's average-size delivery. Second, space should be designated where additional skids of merchandise can be stored on heavy-delivery days. These storage areas, as well as the aisles leading to them, should be marked off. They should be planned to allow easy access to all merchandise so that any item can be loaded on a handtruck without moving a number of other items, and so that pallets can be moved into position. The addition of some type of materials-handling equipment, such as semilive skids or pallets, can often be of great help in storage of merchandise. Shelves or racks for storage of small or single items are also a worthwhile improvement.

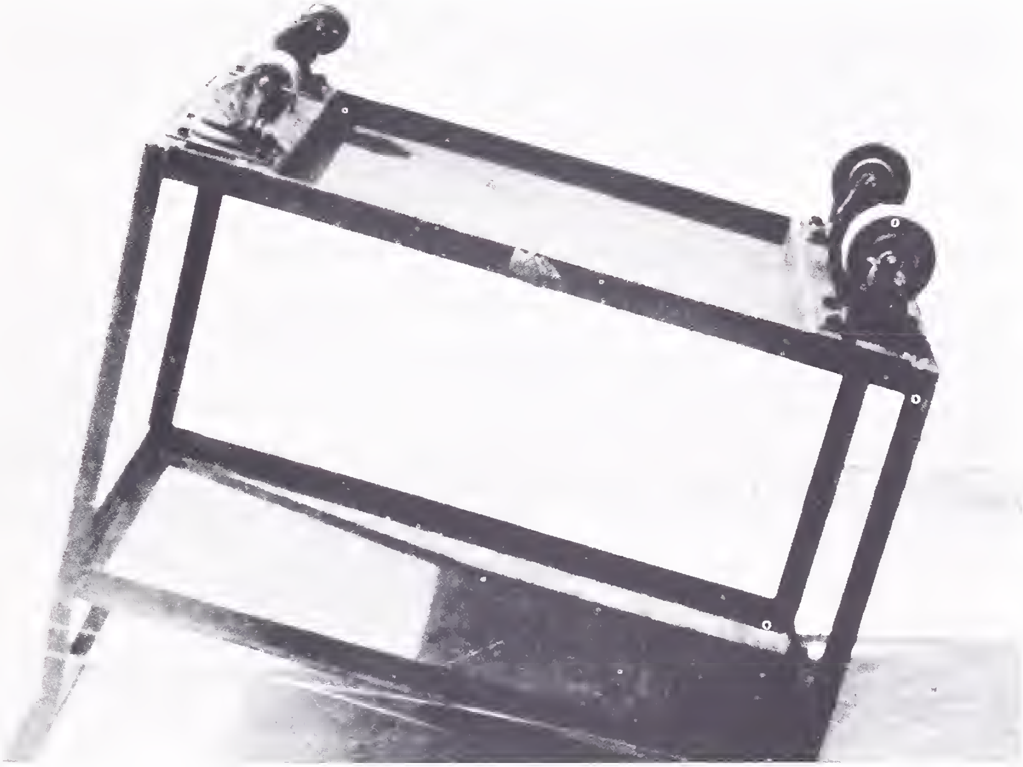
5. Neat and orderly storage for supplies.

All paper, wrapping supplies, twistems, staples, pencils, and similar supplies that are stored in the backroom should be kept in neat arrangement and in fixed places where they will not be damaged. Sheet paper and cellophane should be stored in protecting trays, broken units of polyethylene or paper bags should be kept in separate boxes; twistems should be kept in a divided box which prevents mixing or tangling; and loose labels or tags should be kept in separate boxes. New materials should be kept in the original packages as long as possible, to prevent damage. In most produce departments, there is a considerable loss resulting from mixed or tangled supplies, especially of bags, tags, or twistems which have been priced in advance and not used. These should either be used immediately or discarded. Constructing a closed or locked storage cabinet for these items, and for such other breakable items as glassware or crockery, pays for itself in damage prevention.

6. Adequate tools and equipment.

There should be an adequate but not excessive number of handtrucks, dollies, tubs, knives, garbage cans, hammers, scales and other produce equipment. An excessive number of handtrucks cause congestion, and too few of them cause delays. The best rule is one handtruck per person working regularly. The number of skids or pallets should be adequate to handle the volume without delays. The trimmer should have a sharpening stone for knives, even though an outside sharpening service is used.

Broken handtrucks or dollies or carts with damaged wheels should be replaced. Broken or damaged stamp sets, leaky tubs, and other broken equipment should be replaced or repaired at once (fig. 23). Scales should be checked and kept in good repair.



BN-17981-x

Figure 23.--Worn wheels on a stocking cart.

A system of preventive maintenance of all equipment by store personnel should be initiated. This should involve periodic checks of all equipment, with replacement of defective parts such as burned-out scale bulbs, oiling of cart and dolly wheels, and removal of string from axles. Storage space should be assigned to produce handtrucks and clerks should be required to empty and return them to that space when not in use. Shopping carts should be forbidden in produce backrooms. They are inefficient storage containers requiring about three times as much space as properly stored merchandise. They cause congestion in backrooms, and they bruise merchandise. Prolonged use of them with produce items causes corrosion and rusting of the carts. A good produce dolly costs about the same as a shopping cart and is much more effective.

7. Adequate and properly located workplaces.

The three most used workplaces in produce backrooms are the trimming area, the packaging and pricing workplaces, and a bagging area. Adequate, compact work areas for each operation should be provided, with all the necessary materials, tools, and equipment within easy reach of the operator. There should be space for the product to be processed and for the temporary storage of the completed product adjacent to the workplaces.

Trimming workplaces often can be constructed from available materials. Tables can be cut down or modified to provide adequate work stations with devices for holding the product at proper height and position. Bagging tables can be improved by addition of bins for holding the product, and supply storage can be added, often from materials and equipment on hand. Scales can be relocated and stands rebuilt to provide proper working height and position. Sometimes conveyors and stands, already available, can provide improved product handling at work stations. Store personnel often have the ability to make decided improvements in workplace facilities if given authority and encouragement. The principles of improved workplaces can be incorporated into rebuilt work stations with little difficulty.

8. Proper handling of salvage, waste, and garbage.

One of the greatest causes of confusion in produce backrooms is leaving salvageable crates and waste boxes scattered about. Skids or pallets for storage of salvage and waste should be provided near the points of origin, and all salvage and trash should be collected there. In bulk operations, this should be near the door to the sales area so clerks returning from the sales area can immediately dispose of salvage, trash, and garbage in separate stacks. The trimmer should put all salvage and trash boxes into this area as soon as they are empty. All wirebound crates should be collapsed, and pasteboard boxes broken flat. Other salvageable items should be nested on pallets or skids.

Garbage is collected in some stores in many different types of containers. Boxes and empty crates are used, and later have to be emptied and returned to salvage or trash. Where disposal units are not available, 30-gallon garbage cans should be used, and enough garbage cans should be provided to hold all the garbage accumulated between collections. It should be possible to nest these cans when empty, and there should be a fixed storage space for full garbage cans, preferably out of the backroom.

9. Check lighting, ventilation, working and storage temperatures, and working conditions.

Inadequate lighting causes extra searching for produce in backrooms. It is particulary dangerous in the trimming area, besides making the trimming and packaging inspection job more difficult. Quality control suffers when lighting is poor. Some firms recommend a minimum of 50 foot-candles of light at workplaces.

Poor ventilation of backrooms is deterimental to both personnel and merchandise in storage. Backrooms which are too warm or too cold have adverse effects on the work of clerks. This effect is particularly pronounced in refrigerated produce backrooms, as well as dirty, dark backrooms. Painted walls can have a decidedly favorable effect on morale and working ability of the crew. Another factor often detrimental to working conditions is noise caused by compressors or other devices near work areas.

10. Counter construction and arrangement in display areas.

Some produce counters are altered and "dummied" over a period of time. Style changes result in unattractive displays in older stores. The more modern open-style displays, without glass fronts or other attachments, can often be approximated in older display cases by minor modifications. The use of some plywood, paint, and a few hours' work, if done properly, can make decided improvements in display appearance. Platter or pan bases can be set into the counters, and many displays can be rearranged to give a smoother flow of traffic. In departments having customer service scales, employees can, with little effort, relocate these and construct efficient workplaces for odd jobs. In certain cases, inadequate display space can be corrected by rearrangement or by the addition of overhead display shelving.

While temporary or "in-store" changes are seldom as satisfactory as new store installations, changes in existing stores often result in favorable operating results or better sales. Since work in the produce department is largely a materials-handling job, the facilities for doing this job are especially important.

EXAMPLES OF IMPROVED LAYOUT AND EQUIPMENT INSTALLATIONS IN REMODELED MARKETS

Case Study in Produce Layout No. 1

An analysis of a typical small ($2,500-a-week) bulk produce operation shows some of the benefits of an improved layout (fig. 24). This particular produce backroom was seriously disorganized and was encroached upon by the grocery department to such as extent that there was seldom any available work space. Two coolers and cooler doors cut up the storage space, and the trimming station was poorly arranged.

In the reorganization, aisles and storage spaces were marked off with yellow lines on the floor, and a temporary wire screen partition was added to separate the produce and grocery departments. A work table was provided and a new trim station installed (fig. 25). Semilive skids were installed, and storage slots were marked off in the cooler and dry-storage area. A ramp was provided into the cooler, and one cooler door was permanently closed. The wall separating the two coolers was removed, providing one cooler of manageable size. Changes were made also in the sales area, to provide a single-aisle department with a customer service scale station and auxiliary work station, combined at the end of the traffic pattern. This replaced a dump-table arrangement of the sales area.

The result in this store was an increase in production of 8 percent per man-hour. There was an increase in total store sales, and produce sales as a percent of store sales increased 13 percent. Produce gross profit also was slightly increased.

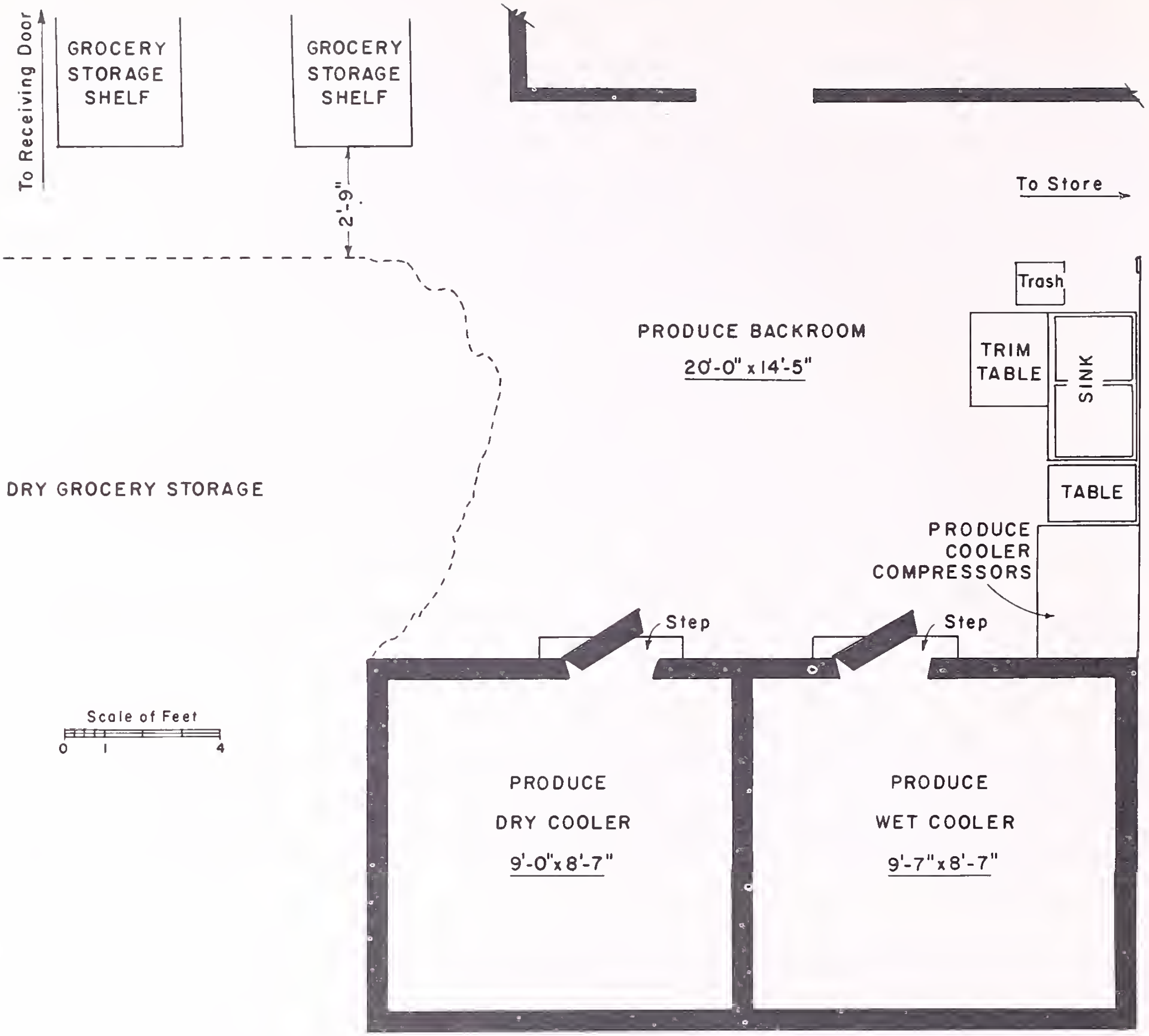


Figure 24.--A bulk produce backroom for a smaller supermarket before reorganization.

Case Study in Produce Layout No. 2

Another example of a remodeled produce department is a prepack produce operation with a volume of $3,000 to $3,500 per week (fig. 26). Prior to the remodeling, merchandise was received on two-wheel handtrucks and stored on the floor, with no organized storage areas. For trimming, a full box or carton was placed on a box or garbage can, and trimmings were collected in salvage crates or lettuce cartons. Packaged items were wrapped on a long table, and sealed with either hot plates or sealing irons. Bagged items were placed into bags directly from the shipping container. Approximately half of the bagged items were received prebagged. Shopping carts were the typical conveyances for moving produce to the display area. Salvage and trash were stored in a somewhat haphazard manner which interfered with the orderly flow of merchandise in the backroom.

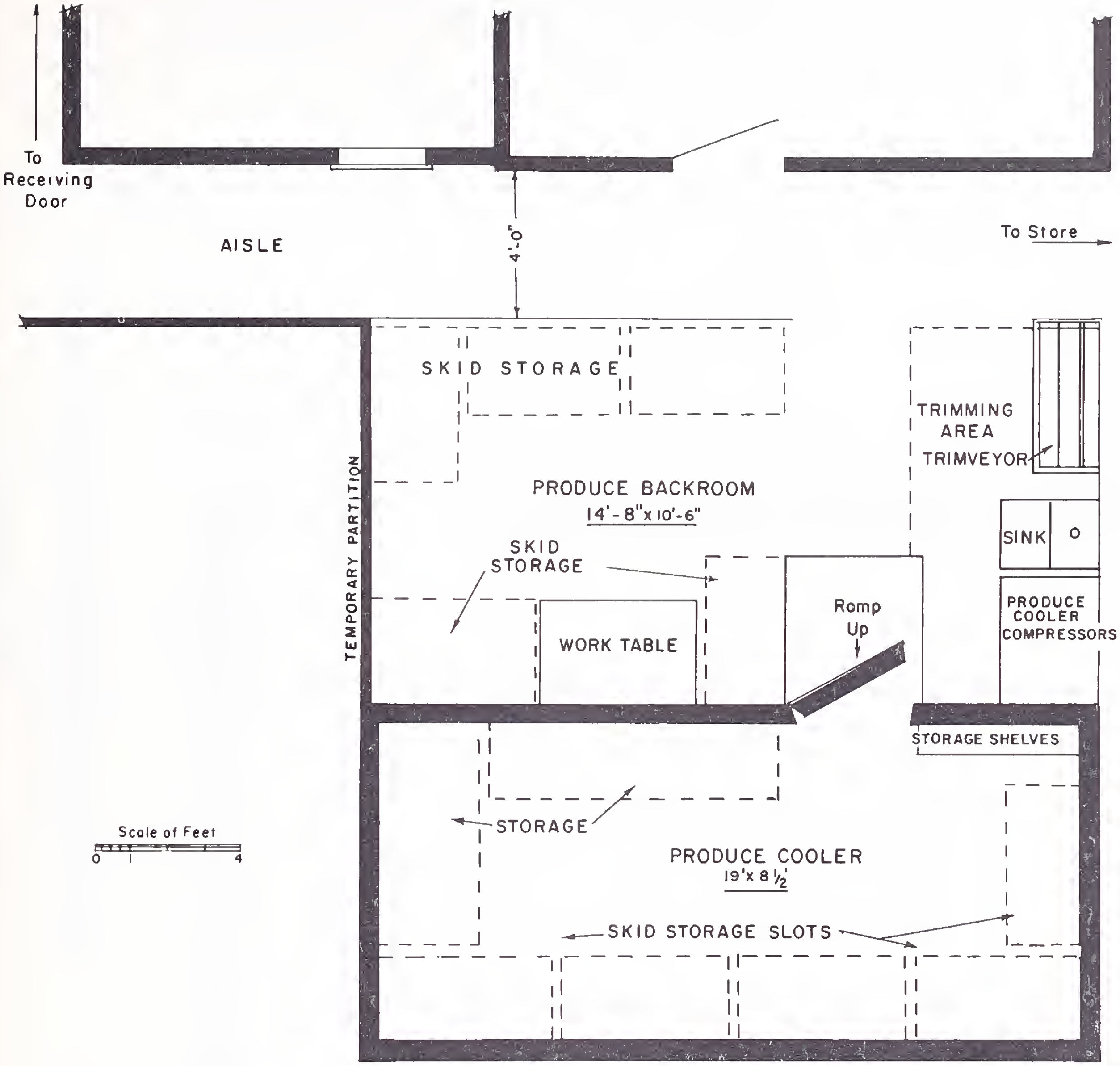


Figure 25.--A bulk produce backroom for a smaller supermarket after reorganization.

In the improved layout, a trimming workplace was provided with a trimveyor under which was arranged a sink, a disposal unit, and a wrapping station for overwrapping trimmed produce (fig. 27). The preferred location of the trimming workplace, from the product flow standpoint, would have been adjacent to the cooler, but as an economy measure the existing sink drain was used, placing the trimming operation several feet from the cooler door. Produce was received and stored on 30- by 42-inch semilive skids. Packaged produce in reserve was stored on trays or flats in a rack in the cooler. Wrapping materials were properly stored, and containers were provided to hold them at work stations.

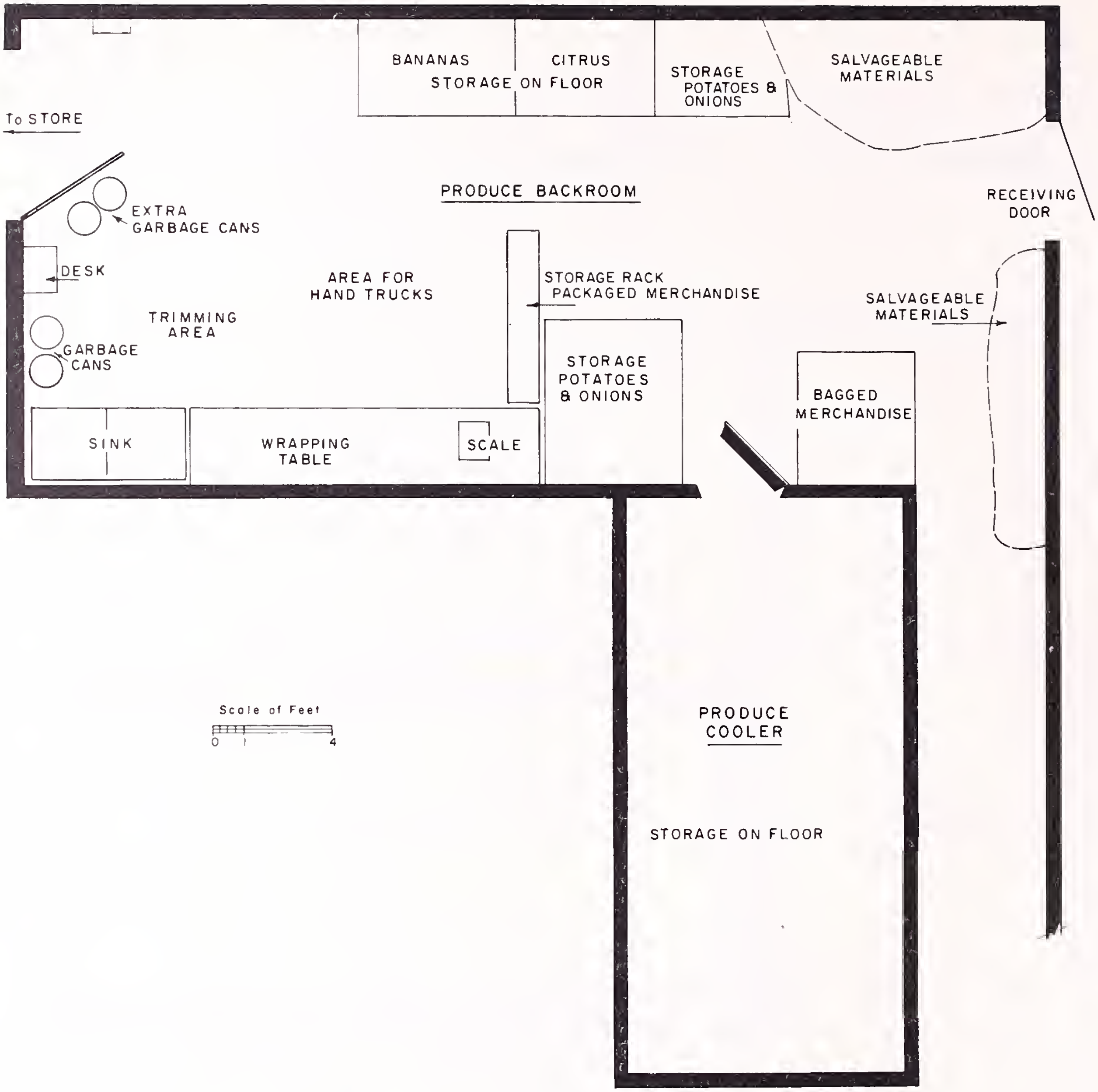


Figure 26.--A prepack produce backroom before reorganization.

Packaged items were wrapped on a right-angle table and placed in flats. These were moved by conveyor to a pricing station. A label printing machine and label activators were added to the pricing operation.

Bananas, cabbage, and some other items were weighed and some vegetable items and potatoes and onions were bagged at a bag-weigh station. A six-shelf display cart was used to move packaged produce to the sales area. A two-deck stocking cart and stacking-nesting plastic tubs were used to handle merchandise bagged in the store.

Salvage and trash were collected on a special skid and moved to the incinerator at specific times during the day. Produce sales in this store increased 5 percent, materials costs were reduced 18 percent, and labor cost was reduced 17 percent.

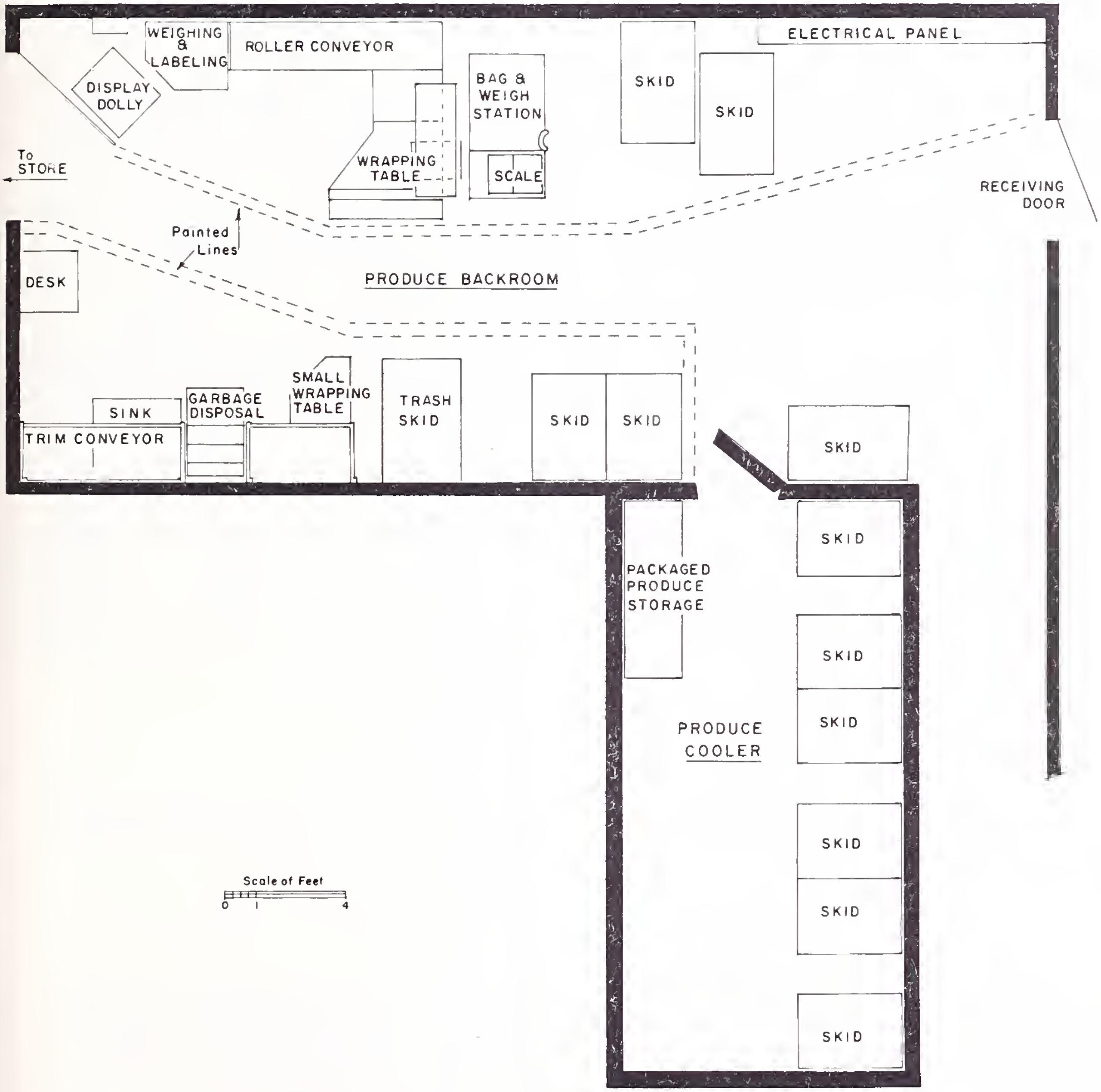


Figure 27.--A prepack produce backroom after reorganization.

Results of Produce Department Remodelings

Remodeling of produce departments according to the principles discussed in this publication can have desirable effects on the operating costs of the departments. There are difficulties in measuring the results because such remodelings usually include not only the improved layout, but also new equipment, improved work methods, better sales area layout, and other improvements.

The effects of such remodeling programs on labor, measured in sales production per man-hour, are shown for seven stores in table 6. These stores were able to increase their dollar sales per man-hour 15 to 88 percent, which would provide a substantial reduction in operating cost per unit in a food store.

Table 6.--Comparison of labor productivity in dollar sales per man-hour for 7 retail produce departments with extensive remodeling changes

Store	Control	Remodeled Store	Change	
	Dollars	Dollars	Dollars	Percent
A 1/	24.32	28.40	4.08	16.8
B 2/	23.21	26.70	3.49	15.0
C 2/	12.47	16.91	4.44	35.6
D 2/	14.64	23.40	8.76	59.8
E 2/	17.00	32.00	15.00	88.2
F 2/	9.70	13.50	3.80	39.2
G 3/	13.46	16.62	3.16	23.5

1/ Test store compared to 2 years' data for 3 control stores.
2/ One year before remodeling and 1 year after.
3/ Six weeks before remodeling and 6 weeks after.

In addition, one chainstore firm reported an improvement in chain average dollar sales per man-hour from $17.77 to $22.75 due to a remodeling program. This represents a 28 percent improvement in productivity.

INSTRUCTING AND TRAINING EMPLOYEES

The task of increasing the productivity of labor and providing more comfortable and less fatiguing work conditions in produce departments is accomplished through the cumulative effects of many small savings. Each change adopted has some effect on other operations, and one recommended practice, without the others, should be adopted only after careful consideration.

Although use of improved equipment, materials, methods, workplaces, and layout helps to solve many problems for the produce department, it is not a complete solution. Physical facilities are no better than the methods used with them. One of the most important factors in successful operation is the proper instruction and training of the manager and his supervisors.

Scheduling of the workers' hours and of the product flow is extremely important (4). When the work is planned far enough in advance, the product can be available when needed and the manager can prevent many interruptions to production.

A well-trained manager will keep the conveyors clear of trash, boxes, pans, and other equipment. He will see that the aisles and the hallways are clear of trash and stray equipment. He will keep a sufficient supply of materials on hand at all times, properly stored. He will help to train the workers in using improved methods, and will insist that such methods be used at all times.

It should be the duty of supervisors not only to understand the best use of methods, equipment, materials, and layout, but also to see that the manager and the personnel continue to use equipment and methods correctly. However, all of these improvements should be made with caution. Most people tend to resist any change that upsets old routines. Even though all of the ideas presented here are based on common sense, a completely new installation often bewilders the most experienced employee. It is essential, and also good policy, to explain to the personnel who will use the equipment and methods, the reasons why the equipment was designed in such a manner, or why such methods are to be used. The most successful method of making an installation or change is to make the operating personnel a part of the program, paying particular attention to their comments and answering any questions they may ask about the change.

Since most of the operations in an improved layout have been changed, supervisors should take time to make sure the changes are understood by all concerned. Only when the new operational procedures are fully adopted and when new habit patterns have been formed by the personnel, and these are understood and enforced by management, can the improved installation be called a success and considered complete.

LITERATURE CITED

(1) Agricultural Marketing Service and Federal Extension Service.
1959. Retail Produce Manual: Organization of the Work Area for Handling Produce in Retail Stores. U. S. Dept. Agr. Mktg. Bul. 2, 12 pp., illus.

(2) Agricultural Marketing Service and Federal Extension Service.
1959. Retail Produce Manual: Ordering, Receiving and Storage of Produce in Retail Stores. U. S. Dept. Agr. Mktg. Bul. 3, 8 pp., illus.

(3) Agricultural Marketing Service and Federal Extension Service.
1959. Retail Produce Manual: Trimming Produce in Retail Stores. U. S. Dept Agr. Mktg. Bul. 4, 16 pp., illus.

(4) Agricultural Marketing Service and Federal Extension Service.
1960. Retail Produce Manual: Managing and Scheduling of a Retail Produce Department. U. S. Dept. Agr. Mktg. Bul. 11, 12 pp., illus.

(5) Agricultural Marketing Service and Federal Extension Service.
1960. Retail Produce Manual: Packaging and Price-marking Produce in Retail Stores. U. S. Dept. Agr. Mktg. Bul. 14, 32 pp., illus.

(6) Anderson, D. L., Shaffer, Paul F., and Hapner, Francis S.
1957. Improved Methods of Trimming Produce in Retail Food Stores. U. S. Dept. Agr. Mktg. Res. Rpt. 192, 46 pp., illus.

(7) _______________, and Shaffer, Paul F.
1961. Display Location and Customer Service in Retail Produce Departments. U. S. Dept. Agr. Mktg. Res. Rept. 501, 50 pp., illus.

(8) _______________, Shaffer, Paul F., and Volz, Marvin D.
1962. Improved Methods of Displaying and Handling Produce in Retail Food Stores. U. S. Dept. Agr. Mktg. Res. Rept. 551, 55 pp., illus.

(9) Shaffer, Paul F., and Anderson, Dale L.
1955. Some Comparative Methods of Packaging Potatoes and Onions at the Point of Distribution. U. S. Dept. Agr., Agr. Mktg. Serv., AMS-12, 14 pp., illus.

(10) Shaffer, Paul F., and Anderson, Dale L.
1956. Unloading and Receiving Produce in Retail Food Stores. U. S. Dept. Agr. Mktg. Res. Rept. 129, 14 pp., illus.

(11) _______________, and Wischkaemper, Paul.
1956. Costs and Sales Results of Alternate Methods of Handling Bananas at Retail. U. S. Dept. Agr., Agr. Mktg. Serv., AMS-149, 10 pp., illus.

(12) _______________, Anderson, Dale L., and others.
1958. Packaging and Price-marking Produce in Retail Food Stores. U. S. Dept. Agr. Mktg. Res. Rept. 278, 85 pp., illus.

(13) Toothman, James S., and Anderson, Dale L.
1958. Equipment Specifications for Tray Display of Produce in Retail Stores. U. S. Dept. Agr., Agr. Mktg. Serv. AMS-279, 18 pp., illus.

U. S. GOVERNMENT PRINTING OFFICE : 1963 O - 680221